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The Outlook

British Parachutists in Italy

LIFE in Italy of late must have been a series of most unpleasant shocks. The bombardment of Genoa was one which must have sent shivers down the spines of all dwellers near naval ports. Was there no limit to the audacity of the British Navy? Where would it strike next? Why did not the Italian Navy drive it away? Or at least interfere with it?

Before nerves had had time to recover from this shattering event, British parachutists landed in Southern Italy, and did something unpleasant—what it was only the authorities know. Next day there was a hold-up on the railways in the South; it may have been just a coincidence, but it may also have been the work of those parachutists. Nobody had expected such a move from the British, and even in Great Britain only a few knew that the possibilities of using air-borne troops had not been overlooked. Of course, the Italian official statements announced that all the British visitors had been taken prisoner, which may or may not be correct, and that would be some comfort to the Italian public. That public, however, is not so easily hoodwinked as are some other European peoples, for the Italians are intelligent and quick-witted. They have lately heard the efforts of Signor Ansaldo to explain away the successive British victories in Libya and the humiliating Italian failures in Albania, and they must by now be somewhat suspicious of glib explanations of untoward happenings.

Some surprise has been expressed that the British authorities should have used parachutists at this juncture on a small scale, thus letting the enemy know that they had such a weapon at hand. Very possibly the explanation is that the strategy of the Greek Army is reaching a point which is critical, and, therefore, it became of the utmost importance to delay the despatch of reinforcements and stores to General Cavallero. The ports on both sides of the Straits of Otranto have been regularly bombed, and submarines and aircraft have been doing their best to make the transit as dangerous and costly as possible. Even so, ships have been getting across. But if the troops and stores could be prevented from reaching the ports of embarkation the effect would be the same as if the ports had been put out of action. So an attack on the railways was deemed justified, even though it meant that air-borne troops would not be able to bring off the same degree of surprise again. That is at least a plausible explanation of the occurrence.

On Two Fronts?

HITLER'S strategy, it has been observed, has always hitherto avoided fighting a major campaign on two fronts at the same time. He appreciates the advantages of working on interior lines, so that he can move his armies from Poland to France and from Norway to the Balkans, if he so desires, but he does not like to fight on more than one front at a time. Yet now the indications are that he is preparing to break his rule and to assail both Greece and Great Britain in the coming months. The great numbers which he commands, both on the ground and in the air, make it possible for him to indulge in the gamble. It may seem to him that it would be a mistake, to be missing a chance, if he did not make use of his numbers while he still has a superiority. If he gives Britain time, she will presently grow stronger than Germany in the air, and when the British Army is fully armed, the command of the seas will enable the War Cabinet to choose the place and time for using it.

Nevertheless, the lessons of 1940 show that in the air Hitler never had enough fighters and bombers to overcome the Fighter Command of the Royal Air Force. If he attempts an invasion, unless the surprise is immediately quite successful, the crucial point will be the command of the air by fighters. If the British keep that, then the chances of the invaders making good are obviously nil. Last year the full available strength of

TO ALL OUR READERS

The Paper Problem

ALL indications point to the fact that notwithstanding the increase this week in the price of *Flight* to one shilling, no appreciable reduction in circulation will result, and our problem of economising paper in the national interest will accordingly remain unsolved.

We would, therefore, again urge upon readers the vital necessity of arranging to share copies wherever possible.

Unless this is done on a wide scale we shall be compelled to ration supplies of copies available to the public through newsagents and bookstalls. If that step becomes necessary, preference will be given to those readers who have placed a definite written order with their newsagent.

You may help to make rationing unnecessary by arranging to share your copy with others. If this is impossible, place a written order with your newsagent immediately in order to protect yourself against disappointment if rationing eventually proves unavoidable.

the *Luftwaffe* was launched against this island in vain. If an invasion is to have any remote chance of success, it will not be possible for the Germans to have too many fighters—and even then the chance is small enough. If a serious movement in the Balkans is made at the same time, numbers of fighters will be needed in that quarter and will therefore not be available for use against Britain. It may be that the Germans calculate that in the Balkans they will need very few fighters—so few that their absence from the northern theatre of war will make no appreciable difference. Presumably the German intelligence department knows (what the British public cannot know) the actual strength of the Middle East Command, and Hitler may reckon that it can be easily mastered. The fact that the Middle East has put the Italian Air Force out of action may well seem of small importance to the self-confident Germans. They have miscalculated before, and they may miscalculate again. For Hitler to launch attacks on two fronts seems as hazardous a proceeding now as it would have been at any past moment.

Singapore

EVER since Japanese official spokesmen have begun to talk about a "new order" in Eastern Asia, together with active interference in French Indo-China and diplomatic pressure on the Dutch East Indies, the thoughtful British citizen has felt a certain wondering anxiety about Singapore. Before the war the R.A.F. Far East Command could only boast of four regular squadrons and the local Volunteer Air Force. Some R.A.A.F. squadrons have lately arrived in Malaya. The actual naval strength at that critical base was (and is) of necessity unknown to the British public.

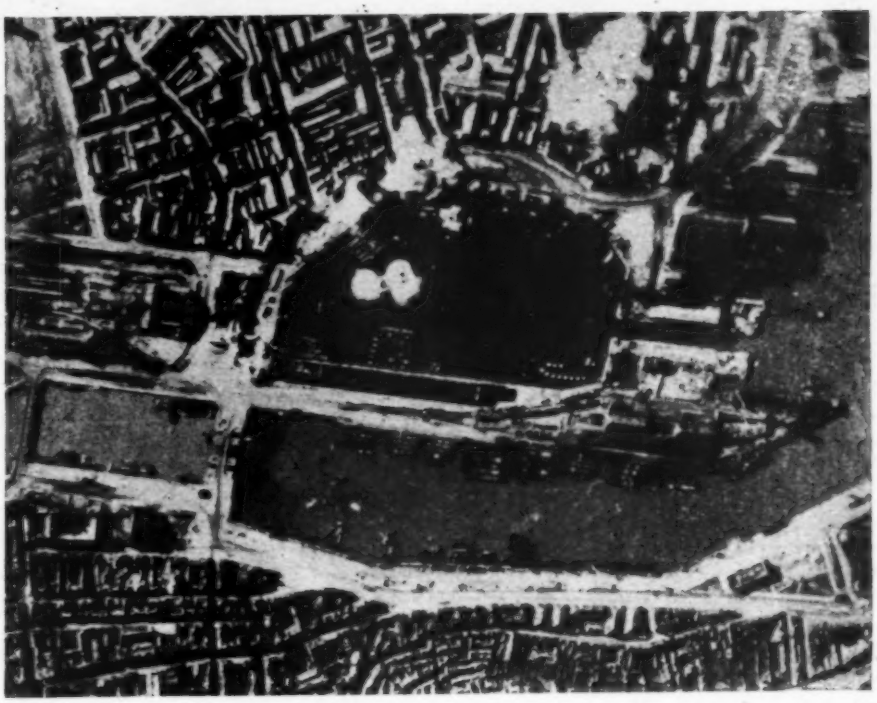
All British Empire interests in the Far East hinge upon Singapore. If that base is strong, not merely in the sense that it can defend itself, but is able to radiate protection to the North, East and South, then all is well with the Empire in that part of the world. If Singapore were to fail, British interests would be very uncertain.

Tremendous relief is, therefore, felt by all now that the arrival of strong reinforcements at Singapore has been announced. While all Pacific units of the Empire as far away as Fiji depend on that base, Australia has a special interest in its strength, and it is, therefore, fitting that Australian troops should undertake the main share of its land defence—for, of course, the safety of the base against attack is the most elementary requirement. Its striking power must depend on naval and air forces, and it is exceedingly comforting to hear that strong Air Force contingents have arrived there.

SUBMARINE KILLERS: Two dozen Lockheed Hudsons on the tarmac at Burbank, California. The original order for 250 Hudsons was completed by December, 1939, and present day deliveries are made by air across the Atlantic.

War in the Air

Singapore Reinforced : Italian Somaliland Invaded : Ethiopian Patriots' Progress



INVASION PORT. Bombs bursting among barges and dock-side buildings during a daylight raid by the R.A.F. on Boulogne Harbour.

THE R.A.F. Command at Singapore, which is under the general direction of Air Chief Marshal Sir Robert Brooke-Popham, Commander-in-Chief of the Far East, has recently received powerful reinforcements of modern bombers, twin-engined fighters, and single-engined fighters. In addition, a very considerable force of Australian infantry and artillery with ancillary services has been landed in Malaya and has taken up strategical positions along the peninsula. Intimation had been received some time ago that some squadrons of the Royal Australian Air Force were in Malaya. These reinforcements are most welcome, as before the outbreak of war the R.A.F. Command had at its disposal only two squadrons of flying boats, two of torpedo-bombers, and the local Volunteer Air Force. As so much care has been expended on bringing the land and air sides of the garrison up to a useful strength, we may conclude that the naval side has not been neglected, and that this all-important base is now in not too bad a case to guard British interests in the Pacific Ocean. It is particularly pleasing to note that British production of aircraft and outturn of air crews have reached a point which make it possible to reinforce overseas stations while at the same time increasing the weight of bombing raids on German and occupied territory. "Appeasement," such as closing the Burma road, should no longer be a humiliating necessity for Britain.

Conquering Italian Africa

A VERY few details have been allowed into the papers about the parachute troops whose sudden appearance in Italy caused so much surprise, but the details do not amount to much. They describe the uniform of the men, who are all volunteers, and how quickly their special parachutes open as they emerge from a twin-engined bomber flying at a low level with its engines throttled down. The men's fighting equipment is lowered by a different parachute.

The air operations round the Mediterranean continue to provide most of the interest. Since the last issue of *Flight* the persistent raiding of aerodromes in Rhodes and the other Dodecanese islands has continued. There cannot now be many aircraft left on those islands, and the supplies of fuel and oil must have run very low. Possibly this rather sudden concentration of interest on targets which before only received occasional attention may be connected with Germany's threat to Bulgaria. It is even possible that Turkey may have made a direct request that the aerodromes so near to her Asia Minor coast should be hamstrung before there was any chance of their working mischief.

The German machines have been getting more active after a lull since their aerodromes in Sicily were so heavily hit by the R.A.F. and the Fleet Air Arm. Some of them have been identified flying at a great height over Macedonia, presumably taking photographs, and these most likely started from some base nearer than Sicily. Others have been raiding Benghazi, and at least five German machines have been shot down there.

In East Africa the R.A.F. and the South African A.F. continue to play an important part in helping forward the various attacks on the Italians. The advance into Italian Somaliland, the most southerly of all the operations, has lately become prominent. The capture of the port of Kismayu near the mouth of the Juba river was an important success by troops drawn from all parts of Africa. The King's African Rifles seem to have been the first to enter the town, while South Africans later on pursued the retreating Italian column. Men on the spot assert that aircraft played the most important part in the battle which led to the capture of the place. There is no mention of opposition in the air. It is strange to reflect on how the tables have been turned on the Italians in East Africa. When they conquered Abyssinia they owed a great deal to the ruthless use which they made of their Air Force, which had no air opposition to encounter. Now the Empire air squadrons are making fairly smooth the paths of the advancing troops, and are not being hampered to any serious extent by Italian aircraft. Further up the Juba river to the North lies the town of Bardera, and outside it the S.A.A.F. has attacked the Italian headquarters and stores. One squadron dive-bombed the targets, releasing both H.E. and fire bombs. The Empire troops then forced their way

WAR IN THE AIR (Continued)

CAPITAL BOMBING: Buildings and aircraft on the Italian aerodrome at Addis Ababa in flames after an attack by our Middle East bombers.

across the Juba river and entered Italian territory. Afmadu is another name which has recently become familiar. The place fell before Kismayu was tackled. The following details about the attack on it have recently been received.

It was the severe plastering from the air that induced the Italians to vacate Afmadu. For two hours on the evening of February 10 South African airmen swept over Afmadu scoring direct hits on the enemy's defensive positions. Apart from bombing, enemy trenches were heavily machine-gunned. Our ground troops concealed in the scrub were greatly heartened by this fierce aerial onslaught. The operation was carried out with the utmost precision. As soon as one wave of bombers had spent its allotted time over the target the next wave was arriving. A subsequent inspection showed that the South Africans had done the job of smashing the defences with remarkable accuracy.

The Ethiopian Patriots

IN Abyssinia the "Patriots" have won a substantial victory under the Emperor's chief lieutenant, and led by British officers, by capturing Dangila in the Gojam province. The Italians had made an air base there and had installed a fairly large garrison. The Patriots were armed with artillery and mortars as well as rifles and machine guns, and the fight for the place lasted for three days. Then the Italians set fire to their petrol dumps and other stores and prepared to evacuate. The Ethiopians charged in and saved the town from total destruction. Then began the business of harassing the retreat. At this sort of fighting the Ethiopians are experts, but the R.A.F. also took a hand, bombing the transport of the Italians from a low height. The aerodrome at Dangila will be very useful to the R.A.F., as it is within easy range of Addis Ababa and other enemy centres.

The Italian Air Force shows up occasionally, and usually has cause to regret its temerity. One Italian sergeant who was taken prisoner after a Caproni had been shot down asked if he might meet and congratulate the British fighter pilot who had mastered it. He said:

"Your pilot's manœuvring was so clever that one member of our crew was convinced that we were being attacked by a number of your fighters. Our Caproni was the first to be shot down. I saw the fighter coming straight for us, and I knew it was all over as far as we were concerned. One short burst of his guns was enough to put us out of action. I was wounded in the knee and foot, but when the pilot baled out I took over the controls and managed to put the Caproni down in the bush."

On another occasion a captured Italian bomber was flown to an R.A.F. station by a Squadron Leader with the Italian pilot and mechanic acting as crew.

The plane was captured by Indian troops in Eritrea after it had force landed on the dried-up bed of a river during the night, and it was decided that the aircraft should be flown back to the Sudan. The Italian pilot and engineer were taken to the aircraft, which had been refuelled, and were persuaded to start the motors and fly back to an aerodrome, where it could be overhauled. "The pilot seemed willing to help," the Squadron Leader said, "but my heart was in my mouth when he started her up. The bomber has a little donkey engine under the seat which starts the main motors. When he swung that up it made such a row I thought of time-bombs and all sorts of things. The pilot told me he had been flying for 25 years, and he took her off the river-bed very nicely and handed her over to me without any trouble. All the controls were, of course, marked in Italian, and I let one marked *sinistro* very much alone." The R.A.F. officer flew the bomber to an aerodrome where wounded British airmen and some other passengers and mails were taken aboard. "We had a bit of a flap at one landing ground," continued the Squadron Leader. "All our gunners in the area had been warned not to fire at a large enemy bomber which would fly over their heads at such and such an hour. All went

WAR IN THE AIR (Continued)

beautifully until at one aerodrome we were approached on landing by a lot of fixed British bayonets. Evidently they had not heard about us, and it was quite a moment until a padre who was with us stepped out and put things right."

The Bombing Duel

THE lull in bombing operations due to the bad weather of winter has naturally resulted in a smaller number of casualties in Great Britain during January than in any month since what we have come to call the blitz began. None the less the figures are tragic enough. During the month 1,502 civilians were killed, of whom 720 were men, 567 were women, and 189 were children under 16. The other 26 were not classified. In addition 2,012 were wounded badly enough to be detained in hospital. The figures of killed for previous months were:—December, 3,793; November, 4,588; October, 6,334; and September, 6,954. The Germans have brought the world to a pretty pass when we actually congratulate ourselves because *only* 1,500 people were killed in a month.

Swansea has been a heavy sufferer from recent German night raids. It was attacked on three nights running, and the damage done and casualties caused were deplorable. The only consoling thing to be said is that the Welsh people bore their ordeal as bravely as those of other afflicted towns have done, and that their civil defence services worked with the same courage and efficiency.

For a good many nights running the attacks on London were of the nature of nuisance bombing, but a chance bomb (most, if not all, hits are due to chance) hit a shelter one night and killed a good many people. Among the victims was a woman doctor, Dr. Lesley Probyn, who had been working among the various shelters in her district every night since the blitz on London started.

Quite a fair number of the raiders have paid the penalty for their brutality, and among our causes for satisfaction was one case in which a night raider was brought down and destroyed by flying into a balloon cable. Two others were shot down by the gunfire of balloon crews.

AIR LOSSES TO FEBRUARY 22.

	GERMAN	BRITISH		MIDDLE EAST	
	Aircraft	Fighters	Pilots	Enemy Aircraft	British Aircraft
Feb. 16	1	—	—	2	2
,, 17	5	—	—	—	—
,, 18	1	—	—	7	1
,, 19	—	—	—	8	2
,, 20	—	—	—	8	1
,, 21	1	—	—	—	—
,, 22	2	—	—	5	1
	10	0	0	30	7

British bombers and fighters lost over enemy territory: Feb. 17, 1; Feb. 20 2; Feb. 21, 2; Feb. 22, 1. Total 6.

Enemy losses by R.A.F. and ground defences in Northern Area, 4,243. R.A.F. aircraft lost in Northern Area, 1,751.

In the Middle East the R.A.F. have destroyed about 1,027 enemy aircraft and have lost 111.

Of course, the R.A.F. Bomber Command has been hitting back, with the vital difference that its object is not the murder of civilians but the destruction of military targets. Wilhelmshaven has been one of the most notable targets in recent days. It should be recorded, too, that one night a flight was made to Cracow and Katowice, in Poland, where leaflets were dropped. This flight must have covered no fewer than 1,750 miles, out and back, and was the longest flight yet made by the R.A.F. during the war. The Poles have been suffering terrible tyrannies from their German oppressors, and have been showing the same unconquerable spirit which their nation has always shown in times of adversity. It must have cheered them in their afflictions to have this proof that their friends are still active and that their arm is growing longer.

Needless to say the invasion ports have not been overlooked, and Brest in particular has been raided several times. There have been some more daylight sweeps over northern France with fighters escorting the bombers.

PARACHUTE TROOP EQUIPMENT

THE excellent job of work carried out by British parachute troops in Italy indicates that their quality and training are good, even if it took our military big-wigs some five years too long to see the manifold uses of such an arm.

Obviously, we cannot describe in detail either the parachute or military equipment used by our troops; to do so would be telling the enemy just what he wants to know, but the problems involved are common knowledge. The aim is to drop the requisite number of troops close to each other in order to establish contact, and as near their objective as possible. Furthermore, it is essential that they be adequately armed for the mission in hand. To meet these various requirements the parachutes employed have two characteristics. They must be of an extremely quick-opening type to allow for low jumps to be made safely (low jumping is the only manner in which contact can be maintained, and during the time of the drop the troops are helpless). They must also be of such a size as will allow a descent to be made at a reasonable vertical velocity. It is usual to use a static line attached to the aircraft to control the opening of the parachutes; this also makes for uniformity of release.

Although, so far as we know, they were never employed, the French Army had parachute troops trained on the Russian model. The surface of the chute they used was 624 sq. ft., and the rate of descent varied, according to the equipment carried, between 16ft. and 23ft. per second. They had an ingenious method of landing slowly. Each man carried a light machine gun and a rifle in special leather bags which were dropped the last twenty feet to relieve the load on the canopy. These bags were attached to the soldier by cords to prevent him from losing his arms in the darkness.

THE RIGHT INSTRUCTOR: Sqn. Ldr. L. Strange, D.F.C., who holds an important post in connection with the parachute troops' training.

If heavier arms are required for the mission, these are dropped in containers attached to special parachutes. Weights up to about 500 lb. can reasonably be handled, and this makes it possible to drop ammunition and guns up to 1½in. calibre, or mortars up to 3in. Small, personal armament in addition to the rifle and sub-machine gun is a matter of private taste and ingenuity. The Germans, for instance, are reported to have small bombs or knives concealed up their sleeves which are released against an assailant by putting their hands up in token of surrender. The story sounds feasible, but in all the photographs of German parachute troops they are wearing cuffs buttoned close to the wrist.

Boots are a special feature. Paratroops of all countries, including our own, wear reinforced leather boots reaching up to the calf. These boots are made in such a way as to prevent injury to the ankles in the event of a heavy landing. The purpose is not quite clear, but the Germans wear a narrow leather strap round each thigh just below the leg harness. For head protection the standard English steel helmet would be worse than useless, and a snug close-fitting type with no brim is necessary.

BRAVE MAN'S MARK: The distinguishing badge of the British parachute troops.

SALVAGED : British Overseas Airways' flying boat, *Clyde*, which dragged her moorings and sank in the Tagus during a recent storm at Lisbon, has been successfully raised. She is reported to have sustained such heavy damage, however, that it is doubtful if she will be repaired and recommissioned.

HERE AND THERE

Rhodesian Pilots Arrive

THE first contingent of Southern Rhodesian pilots, trained in their own Dominion, recently arrived in England for service with the R.A.F. They will operate together when Rhodesian squadrons are formed.

Help from U.S. Airlines

IN order to meet their own country's national defence needs and to permit immediate despatch of four-engined bombers to Great Britain, certain scheduled U.S. airlines have agreed to the release of aircraft and engines to the value of something like $7,500,000 which they had on order for 1941.

Air Crew Volunteers from Overseas

BRITISH subjects are coming home from all parts of the world to volunteer for air-crew duties under the Overseas Recruiting Scheme and, according to a recent statement by the aeronautical correspondent of *The Times*, more than 80 per cent. of them have been accepted for training as pilots.

Under this scheme such volunteers are provided with their passage home, and they are coming from the Bahamas, Honduras, Venezuela, Cuba and from British Colonies such as the Leeward Islands, Bermuda, Trinidad, the Seychelles Islands and Mauritius. One young Scotsman living in Patagonia is reported to have ridden several hundred miles on horseback to catch a boat from Buenos Aires.

Aircraft Production

THE March issue of *Aircraft Production*, published yesterday, contains as its chief features the final instalment of the article describing the production of the "shadow" Blenheim at the Rootes factory, and, under the title of "Airscrew Assembly," an article describing the ingenious and unusual application of conveyor and rail track systems at the Rotor works; also an article devoted to the machining and installation of Plexiglas, the American transparent covering produced from plastic sheet for turrets blisters and noses. The importance attached to the problem of standardisation in aircraft manufacture is shown by three pages devoted to an important series of discussions in America. Also included in the issue are illustrated descriptions of the four-engined Boeing and the Curtis Tomahawk, whilst there are the usual reviews of modern machine tools and shop equipment.

Aircraft Production is the journal of the aircraft manufacturing industry and costs 1s. 6d.

Keep Up the Quality

STRESS was laid on the need for quality as well as quantity in the production of aircraft by Rear Admiral John H. Towers, chief of the U.S. Navy's Bureau of Aeronautics, in his annual report. A recent issue of *American Aviation* quotes him as saying, "Important as is the necessity for accelerating production, we must not fail to realise that, while we are catching up with foreign nations in productive capacity, there is danger that lack of emphasis on development and experimentation may leave us with inferior aircraft to those of foreign countries which are able to concentrate on this phase. It is essential that increases in facilities and funds for experiments and developments be provided and that there be no diminution of effort in this important field."

H.R.H. Group-Captain the Duke of Kent visited the Rotol airscrew factory recently. He is here seen with Mr. R. H. Coverley, the controller of the company.

Memorial to Amy Johnson

A FLYING scholarship is to be founded by the Women's Engineering Association as a memorial to its former president, Miss Amy Johnson, who lost her life a few weeks ago in the Thames Estuary.

Tunnel Expert for M.A.P.

DESIGNER of the Mersey tunnel and the Rotterdam-Amsterdam tunnel, Mr. Brian H. Colquhoun has just been appointed director of aircraft production factories under the Minister for Aircraft Production.

Mr. Colquhoun, who is thirty-seven years of age, hails from Appleton, Cheshire. The Rotterdam-Amsterdam tunnel, incidentally, was built in record time, and was said to have employed the biggest number of workers of any engineering undertaking in Europe.

A.T.C. Still Expanding

ADDITIONAL lists of newly formed squadrons and flights of the Air Training Corps, issued by the Air Ministry during the past week, have brought the total of registered units to no fewer than 588.

Of 145 names on the fourth list, for example, 133 were of new squadrons in England, nine in Scotland and three in Wales. The fifth list, issued three days later, was confined entirely to new school squadrons and contained an additional 101 names, divided between England (79), Scotland (13), Wales (7), and one each in Northern Ireland and the Isle of Man. Since then another 86 local units have been duly registered, of which 72 are in England, nine in Scotland and five in Wales.

Incidentally, questions affecting A.T.C. school squadrons in Scotland will in future pass through the hands of Mr. Harry Bell, Rector of Dollar Academy, Clackmannanshire, who has been appointed adviser to Mr. Wolfenden, the Director of Pre-entry Training at the Air Ministry, for this special purpose. Mr. Bell, who is also secretary of the Scottish Headmasters' Association, will remain Rector of Dollar Academy as the work involved by his A.T.C. appointment will be part-time only, and any communications for Mr. Bell should be addressed to him at the academy.

Concurrently with the launching of the A.T.C. scheme, the *Air Defence Cadet Corps Gazette* has changed its title to *Air Training Corps Gazette*. The first issue is on sale at bookstalls to-day (price 6d.), and contains special articles by Air Commodore Chamier and Mr. Wolfenden, in addition to many other features of interest to the A.T.C.

TWO R.A.F. PURSUIT SHIPS

Some Notes and Particulars of the Curtiss Mohawk and Tomahawk

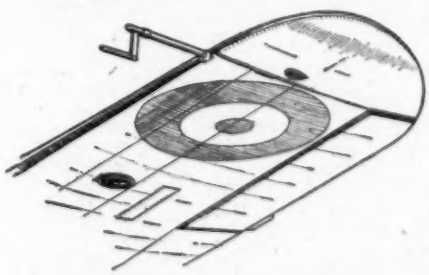
Two Mohawks in formation. The ports for the synchronised fuselage guns can be seen on the top of the engine cowling.

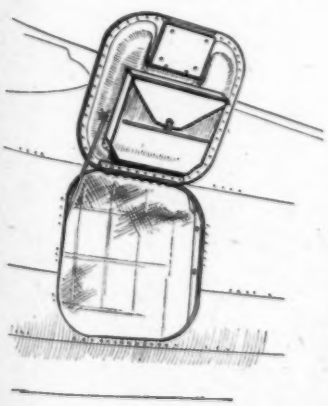
Mohawk		Tomahawk	
Span	37ft. 3½in.	Span	37ft. 3½in.
Length	28ft. 9½in.	Length	28ft. 11in.
Height	9ft. 3in.	Height	10ft. 8in.
1,200 h.p. Wright Cyclone engine.		1,100 h.p. Allison engine.	

ALTHOUGH outward appearances are so different—the Mohawk's entry is as blunt as that of the Tomahawk is sharp—the two machines have much in common. It can be said that the Tomahawk (Curtiss P.40) is a development of the Mohawk (Curtiss P.36A) and fitted with a liquid-cooled Vee 12 engine. The wing construction is the same in each case, being a stressed-skin multi-spar structure. In the Tomahawk, however, flush riveting has been employed to produce the few extra knots so eagerly sought after in wartime.

Ailerons take up nearly one-half of the wing span, and split flaps occupy the remaining length of trailing edge. Unlike the English system of putting the landing lights in the leading edge, the Curtisses have theirs fitted under the port wing and operated by retraction gear. In both types the wing tips are easily detachable in case of damage, and the navigation lights are semi-inset in the upper and lower surfaces.

The Tomahawk has flare chutes in each wing, a feature which does not occur on the Mohawk, but the latter has flush-fitting bomb racks to take a variety of bomb loads. These racks provide for ten chemical or fragmentation bombs of about 25lb. each, or for six 50lb. high-explosive bombs. The Mohawk can also be fitted to take one 500lb. H.E. on an external rack under the fuselage.





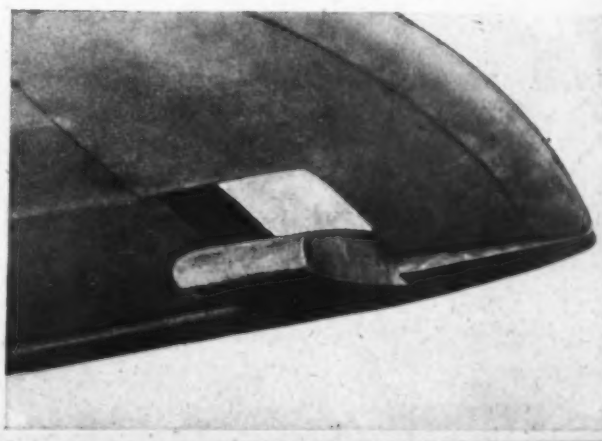
The detachable wing tip, semi-inset navigation light, retracted landing light, flare chute, American-type pitot head and aileron of the Curtiss Tomahawk. (Left) First aid outfit on the Tomahawk is behind the door of a small luggage compartment. (Right) Contrary to the usual practice of putting the horn balance of the elevator at the tip of the tail plane, the Tomahawk has it a few inches inboard.

"Flight" photograph and sketches.

Another similarity between the two types is found in the hydraulic mechanism of the undercarriage retraction and flap operation. Instead of having an engine-driven pump, as is common in English systems, the Curtiss Company employ a fractional horse-power electric motor driven from a battery which is charged by an engine-driven dynamo. The motor drives an independent hydraulic pump and gives the pilot the advantage of being able to operate his undercarriage and flaps despite a dead engine. As a further safeguard a hand pump is also installed. Although this independent system may have some advantages, a major snag is the speed of operation. A Hurricane or Spitfire has its legs nicely tucked up 15 seconds after opening the throttle for take off, while either of the Curtisses will require something over 40 seconds.

Hydraulic Operation

The retractable undercarriage, including the tail wheel, is identical in the two machines. By a system of bevel gears and hydraulic rams the legs are lifted directly backwards and upwards. During the travel upwards the wheels make a full 90 deg. turn to fit flush into the wheel wells in the wings. All this seems rather unnecessary, because there is still a knee joint projecting under the leading edge after employing all this complication. The landing gear weighs some 560 lb. The actual operation of the flaps and undercarriage is of some interest. The pilot makes his selection with a gear shift lever and then, at the appropriate moment, presses a button on the top of the joy stick to set the mechanism in motion.



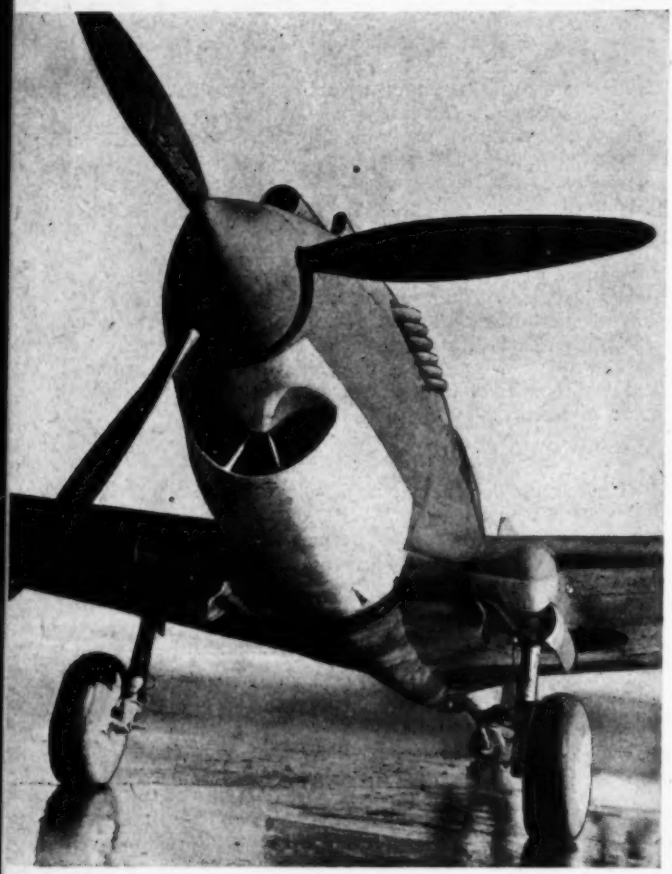
An interesting comparison. A Tomahawk and a night-fighting Hurricane side by side on the tarmac. Both are roughly of the same horse-power and weight. The Hurricane has no retractable tail wheel and all its leading features are blunt, yet in its latest form it is quite equal in speed to the American.

"Flight" photograph.

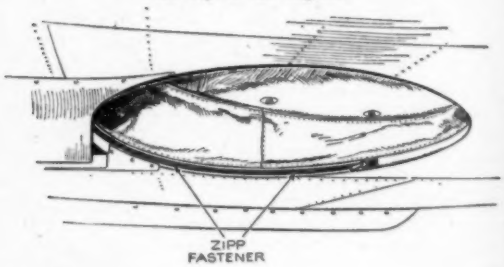
TWO R.A.F. PURSUIT SHIPS (Continued)

The Mohawk weighs 4,712 lb. empty and 6,242 lb. fully loaded. For the Cyclone there is tankage to carry 136 Imperial gallons, and the maximum speed is 323 m.p.h. at 15,000 ft. Armament of the American version is four rifle-calibre machine guns in the wings and two slightly larger ones of 0.5in. calibre firing through the airscrew disc. A Curtiss electrically operated three-bladed constant-speed airscrew with duralumin blades is fitted.

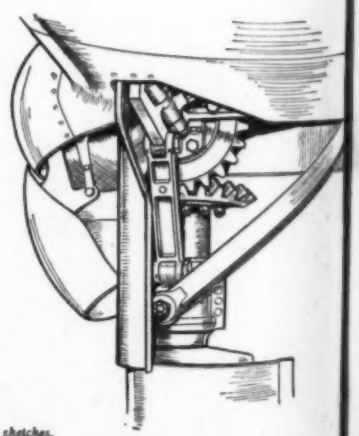
The Tomahawk also has a Curtiss electrically operated airscrew to suit the 2,800 r.p.m. of its liquid-cooled Allison engine. This engine, which is only just getting through its teething troubles, appears to be rather sprawling by comparison with the Rolls Merlin, which is the nearest English equivalent. For getting rid of excess heat there is, under the nose, a streamlined air scoop, which is divided into three sections. The two outside segments lead to circular honeycomb radiators containing the engine coolant, and the centre passage leads to a smaller radiator, also circular, for reducing oil temperature. Control of radiator temperatures is by articulated gills situated under the belly to the rear of the engine. One of the drawbacks of all the American types, and the Tomahawk is no exception, despite its new liquid-cooled engine, is the low operational heights for which they are supercharged. For the Tomahawk this is 16,000 ft., at which a maximum speed of 360



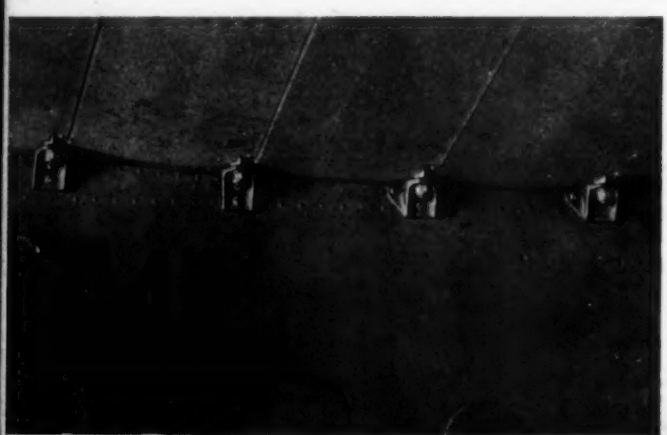
(Left) This view of the nose of the Tomahawk emphasises the radiator ducts, and the air intake and gun chutes on the top of the engine.



A zipp-fastened fabric cover clothes the interior of the wheel wells on the Mohawk. By operation of the zipp access can be had to the interior of the wing.



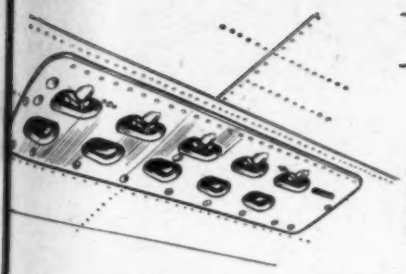
(Right) The Curtiss mechanism for retracting the undercarriage and turning the wheel 90 deg. at the same time.



(Left) All surfaces of the Tomahawk are pure cantilever and this photograph shows the method of attachment of the tailplane. The bolt holes for the fillet are also shown.

"Flight" photographs and sketches.

TWO R.A.F. PURSUIT SHIPS (Continued)



Particularly neat are the flush-fitting bomb racks under the wings of the Mohawk.

m.p.h. is obtained. At and around the top speed it has been found impossible to operate the transparent cockpit cover and, since this might easily be a fatal failing, geared handles have been installed to give the necessary extra leverage.

The Tomahawk is some 700 lb. heavier than its predecessor, its all-up weight being 6,914 lb. Empty it weighs 5,500 lb. Armament, as specified for the French contract (those arriving now are of this type and have metric instruments), is two 0.5in. synchronised guns lying along the top of the engine and firing through the airscrew disc, and two rifle-calibre machine guns in each wing. Whether the R.A.F. will increase the offensive weapons is not disclosed.

Correspondence

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers not necessarily for publication, must in all cases accompany letters.

ELECTRICIANS AND MASS PRODUCTION

Limited Scope in Aircraft Factories

AS a regular reader of *Flight* may I put forward a plea on behalf of those electricians in aircraft who, like myself, now find their whole future jeopardised, due entirely to the lack of information regarding the one thing which is of vital importance to us, namely, the future prospects of electricians working in the aircraft industry. I was an indentured apprentice with Messrs. Anderson & Munro, Ltd., and later served with Messrs. Alex. Lindsay, Ltd., Fraser & Borthwick, Ltd., and R. M. Russell, Ltd.—four leading electrical engineers and contractors in Glasgow, and for four years was employed by The Western Union Telegraph Co., Ltd., as an electrical and mechanical equipment installer.

As I was very keen on aircraft I resigned from telegraphy and made application to an aircraft factory for employment as an electrician, and was successful. But though I was successful in achieving my immediate aim, was I successful in adding to my very limited knowledge of aircraft? Definitely no! Regarding future prospects, well I do hope you or some of your subscribers will furnish some enlightenment in that respect.

It is the Government's policy at present to speed up production to its absolute maximum, with which I wholeheartedly agree, but on the other hand this self-same policy must, to be successful, put a definite obstacle in the path of those who would wish for a wider experience in aircraft, as, to achieve the maximum output, mass production methods must be adopted, which means when it is established that a man is competent on a certain operation. He is put on that operation day after day, week after week, month after month, in fact possibly until we have crushed and obliterated Nazi-ism from the face of the earth. In other words any man of average abilities in, say, three months as a generous margin, can become just as proficient as the skilled tradesman who had to serve his apprenticeship. The fact that the aircraft industry has at present enrolled a great many employees working as tradesmen who cannot furnish apprenticeship lines, proves this statement, and my only reason for mentioning the names of my previous employers is to contrast my past training with my future prospects.

I speak for the apprenticed electricians, as it has been my experience in my present employment that it is the unskilled men and not the skilled men who are going home with the largest pay envelopes at the end of each week. I mention this fact, not from a mercenary viewpoint, but in order to stress the extreme urgency in maintaining the standard of efficiency practised by the skilled tradesman prior to our entry into war, otherwise these men, whose greatest obstacle at present is their knowledge of electricity, are going to find their livelihood very seriously threatened by fierce competition from those who are, even now, turning their operations out quicker than the skilled men. This is proved by the pay envelopes of the men working under the bonus system. The only reason I can put forward for this state of affairs is that the skilled man is more cautious and puts more body in his work. That is to say, the unskilled man is only concerned with getting his operation passed by the inspector, so, therefore, does a good surface job, whereas the skilled man realises his responsibilities and makes sure that his job is 100 per cent. under the surface as well as on the surface.

I am 28 years of age and have, therefore, a very great deal to learn. As I have sacrificed a fairly decent job in telegraphy in an endeavour to obtain a good grounding on aircraft, I can assure you I am very disappointed indeed and should be glad if you could suggest how I, and all other electricians in the same position as myself, can further our ambition to become something more than just a semi-skilled labourer. Trusting you will find space in your Correspondence section for my letter, which I have only written because I consider it extremely urgent that the foregoing should be brought to your notice. M. MACD. CHAMBERS.

ASSISTED TAKE-OFF

Variable Incidence Suggested

IN reference to the present controversy on "assisted take-off," I consider the main point to be the reduction of wing area to the minimum necessary for flight *whilst in the air*. Working from this point, we know that any simple and practicable suggestion to assist take-off would have a double advantage: first, in the value of the sugestion itself and, secondly, in the increased speed which the aircraft could reach on gaining the necessary height.

Assuming we have constructed the aircraft with its reduced wing area, could we not then have an area at the end of each wing so adjustable that the angle could be varied for the take-off and, if necessary, for landing?

The construction may cause difficulties, but I am sure our good workmanship should easily overcome them if the idea solves this much discussed problem.

RALPH C. TAYLOR.

Another Telescopic Wing Advocate

WITH reference to Mr. Manley's mention of the retractable wing in *Flight* of February 6th, I wish to point out two facts which alone prove that it is the most practical suggestion towards the problem of the assisted take-off.

As Mr. Manley remarked, the idea is not new and an experimental type was developed by Mr. Makhonine in which telescopic wings were employed and they proved themselves extremely successful. The take-off run and also the speed in the air with wings extended and retracted respectively were greatly increased.

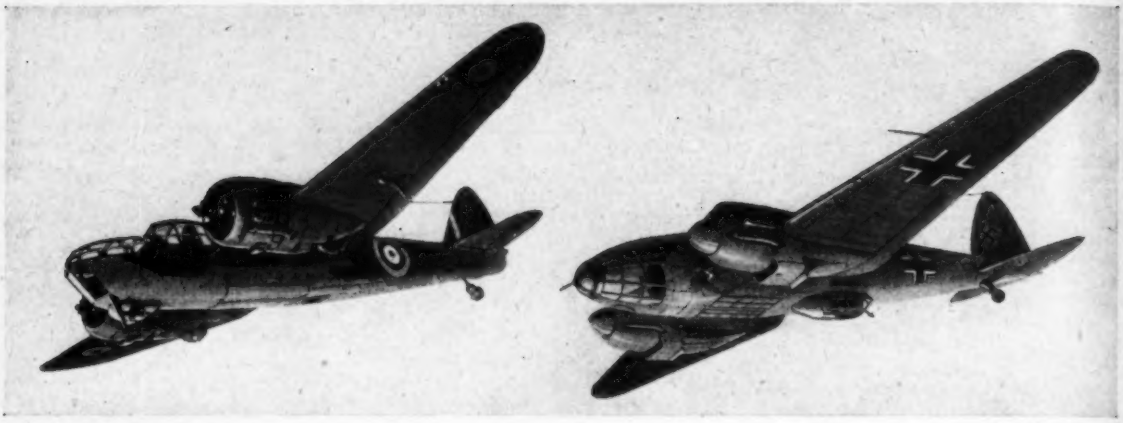
The increase in speed was 37 m.p.h. which, for an aircraft of this type, low powered as it was, was especially good, and I seriously think it should be developed in modern bombing and fighting aircraft. D. P. GOODALL.

[The telescopic wing is impracticable in modern military aircraft because of the amount of equipment stowed inside the wing. Variable-incidence wing tips would be the surest way of precipitating a spin.—ED.]

Eighth of the Series

FRIEND or FOE?

Points for Identification of Two Familiar Bombers

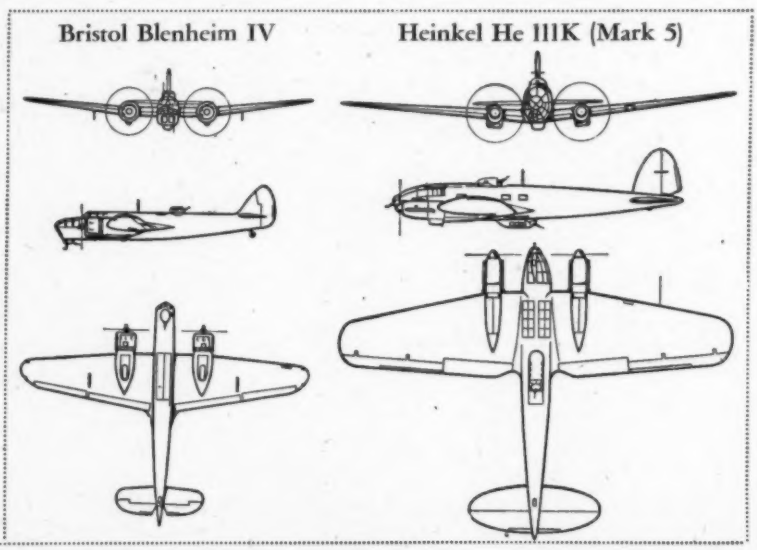


Bristol Blenheim IV. Mid-wings taper sharply in plan and are moderately pointed at tips. Dihedral outboard from engines. Radial engines in squat nacelles from which wheels protrude slightly when retracted. Transparent panels in nose; gun-turret amidships and under nose. Curved trailing-edge to tailplane. Large rudder.

Heinkel He 111K (Mark V). Low-wing with pronounced taper to leading edge and small, rounded tips. Dihedral from roots. Inverted Vee-type engines with "beard" radiators in squat, rounded nacelles. Transparent oval nose; symmetrical fuselage; gun position above and under turret aft of trailing-edge. Elliptical tailplane; large fin and rudder.

ONE of the most widely known of British aircraft, the Blenheim IV, now appears in a slightly modified version which has a small gun-turret under the nose in addition to the usual one amidships. In every other respect its appearance remains the same as when it was first developed from the "short-nosed" Blenheim I. The Heinkel He 111K (Mark V) has visited this country in considerable numbers (and received an overpoweringly warm welcome from Spitfire and Ack-Ack reception committees!), and, inasmuch as they are both twin-engined bombers with single rudders, knowledge of the external features which identify one from the other should be extremely useful. Fortunately, their differences are easily spotted.

The wing plan of these two machines is markedly different. That of the Blenheim tapers sharply, mostly on the trailing-edge, to almost pointed tips, whereas that of the Heinkel has a pronounced back-sweep to the leading-edge and an almost straight trailing-edge, the tips being small but rounded. A most unusual feature of the He wing is the cut-away of the trailing-edge at the roots, but this will only be visible when the aircraft is directly overhead. Seen from a head-on attitude, the Blenheim wing has its dihedral outboard of the engine nacelles, but that of the Heinkel, which is rather more pronounced, starts from the roots. The Blenheim, of course, has Bristol radial engines, and the Heinkel, inverted Vee-in-line units. But, as the latter are encased in nacelles of almost circular section, there is a similarity in their frontal appearances.



Another marked difference is to be found in the respective noses of these two machines, that of the Blenheim being roughly bath-shaped with transparent panels on its curved upper-surface and two large "windows" in the sloping front of its lower half. The nose of the He, however, is oval and completely transparent, and has a gun mounted in an eccentric nose-blister. In contrast to the raised top of the pilot's cockpit of the Blenheim and its dome-shaped gun-turret amidships, there is no break in the symmetrical fuselage of the Heinkel until it reaches the screened gun-position almost level with the trailing-edges of the wings. The He 111K also has an under-turret aft of the trailing-edge. Tail assemblies are also distinctive. The British aircraft has a comparatively small fin blending into a large rudder, the nicely curved trailing-edge of which projects well behind the elevators. The Heinkel, however, has a tall, narrow rudder attached to an enormous fin, the two forming an inverted "U" flush with the trailing-edge of the elliptical tailplane.

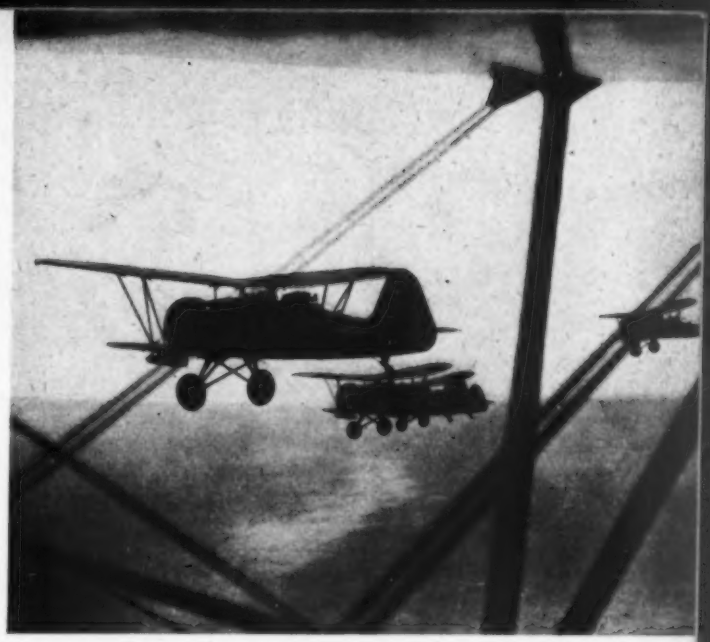
Types previously compared: (1) Hurricane and Me 109; (2) Spitfire and He 113; (3) Beaufort and Ju 88; (4) Lysander and He 126; (5) Hudson and Me 110; (6) Anson and Fw 187; (7) Hereford and Do 215. *Next week: Skua and Ju 87.*

NIPPON'S AIR POWER

Strength of the Japanese Air Weapon in the Pacific

IN view of the possible outcome of the tension in the Far East it is of interest to assess the air power which it would be possible for Japan to bring to bear in eastern waters.

Japan has already been at war for some five years, and it is reasonable to expect that the people and the army are becoming a trifle war weary. In dictator countries—and Japan is just as much a dictator country as is Germany—populations have little say in the matter during the early stages of war weariness. The Japanese army in China, which is like a small, ill-tempered and cruel child stamping its feet in impotent rage, may be heartily sick of everlasting marching and counter-marching; it will, however, continue to march and counter-march. Nevertheless, it is with neither of these that we are likely to be troubled, but rather with the Japanese navy and naval air service. Since China possesses no fleet, and very little in the way of an air force at all, the Japanese navy have had no really war-like occupation during the Sino-Japanese campaign. Thus—bearing in mind the fact that for many years every midshipman entering the Japanese navy has been told to make himself efficient against the day when Japan sails against England—the navy is not in the least likely to be suffering from an overdose of war. So much for the mental aspect; what is the material position?



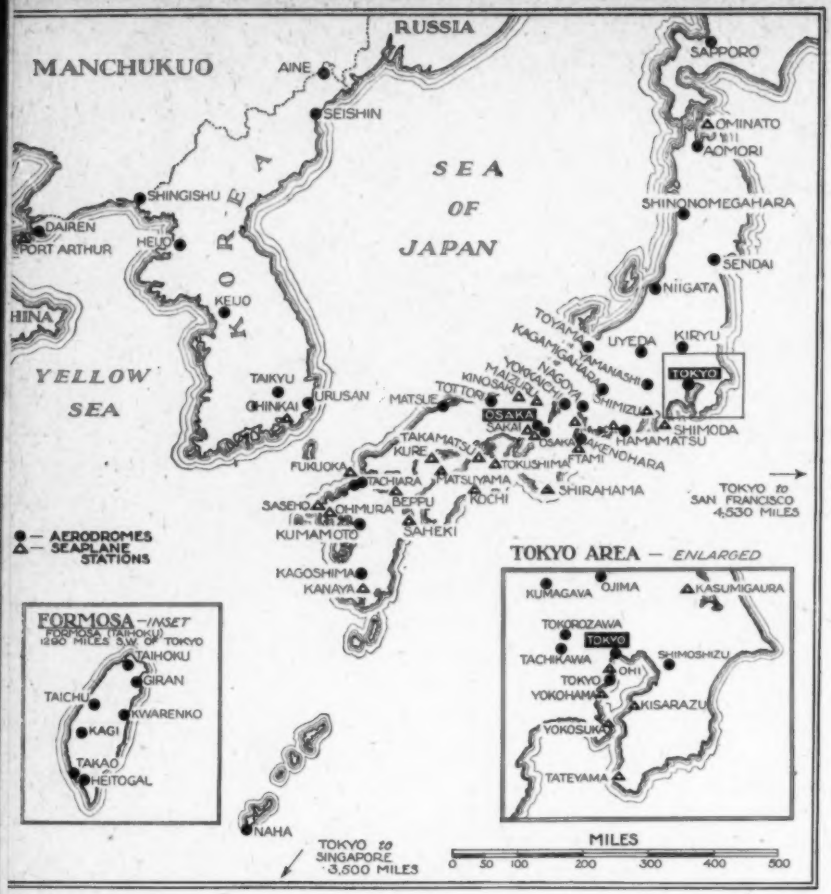
OVER CHINA: A formation of Nakajima 94 army biplanes on a bombing expedition. This type is also used for supply-dropping and message picking up.

Japan has no independent air force as we know it; all the squadrons are divided between the army and the navy. In its early days the army side had mostly French machines and French or German instructors. The influence could be seen in some of the original

NAVAL AND MILITARY: Used by both services, the Mitsubishi 96 twin-engined bomber is of modern all-metal low-wing layout. Span, 82ft.; length, 52ft. 6in.; height, 11ft. 6in. The engines are 1,000 h.p. 14-cylinder Kinsei radials.

NIPPON'S AIR POWER (Continued)

CARRIER FIGHTER : The Navy 95 type fleet fighter. Powered by a 550 h.p. supercharged Kotobuki (Bristol licence), the maximum speed is 214 m.p.h. It has a two-position two-blade airscrew. Armament consists of two synchronised machine guns.

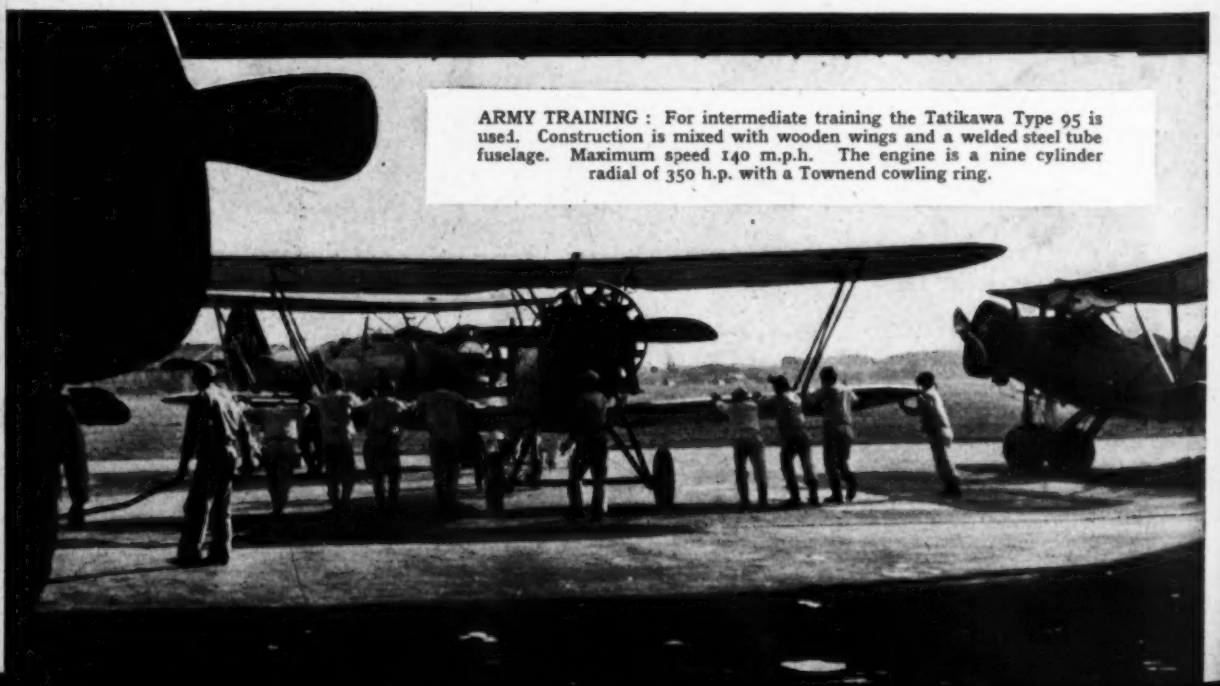


RELATIVITY : A "Flight" copyright map showing the position of most of the Japanese aerodromes and seaplane stations. Mileages to San Francisco and Singapore are also indicated.

Japanese-designed types; they looked rather like the old French *multiplace de combat* types with turrets sticking out everywhere, which had been built by Junkers. For naval and naval air matters, however, Britain was taken as the model. This choice of instructors, on the face of it, shows a certain sagacity of mind, but the subtle difference between a military and a martial nation is not realised. As a naval power, Japan would have done better to have followed our military outlook, because only Germany, with 80 millions of predatory sheep, can carry out German military strategy.

Nippon has never been very communicative as to her internal affairs and, as she has been at war since 1937, she is now more secretive than ever. It appears that the army, with its H.Q. in Tokyo, has, allowing for a normal expansion since the last figures were available, some sixteen or so aviation regiments, each of four squadrons. This total of 64 squadrons is probably made up of one-third fighter and fighter-reconnaissance and two-thirds bomber and bomber-reconnaissance. Seven schools are included in the army aviation establishments, and these are located at the following places: Technical and Flying Training at Tokorozawa; Aerial Fighting at Akeno; Tactics and Reconnaissance at Shimoshizu; Bombing at Hamamatsu; Air-pilotage at Kumagi; Air Defence at Inagemachi; and a boys' training school, on the lines of our Halton, at Murayamamura.

The naval air service is credited with between 40 and



ARMY TRAINING : For intermediate training the Tatikawa Type 95 is used. Construction is mixed with wooden wings and a welded steel tube fuselage. Maximum speed 140 m.p.h. The engine is a nine cylinder radial of 350 h.p. with a Townend cowling ring.

NIPPON'S AIR POWER (Continued)

50 squadrons, and it is third only to Great Britain and the United States in aircraft carrier tonnage. These carriers comprise the *Kaga* (60 aircraft); *Akagi* (50 aircraft); *Soryu*, *Hiryu* and *Koryu* (all three of 40 aircraft capacity); *Hosho* (26 aircraft); and *Ryujo* (24 aircraft). In addition, there are five specialised seaplane carriers of about 10,000 tons each. The last published figures showed Japan as having nine battleships in commission, but doubtless there are at least another four of 35,000 tons each, building or completed. What these new ships will mount in the way of aircraft and catapults is a matter for conjecture, but probably they will each have one or two catapults and up to three seaplanes. All the nine ships of which information is available have one catapult and two or three seaplanes each. These battleships were all built between the years of 1912 and 1921, but all have been modernised since 1928. Five of them were completely reconstructed in 1936 and can, therefore, be reckoned as almost new ships.

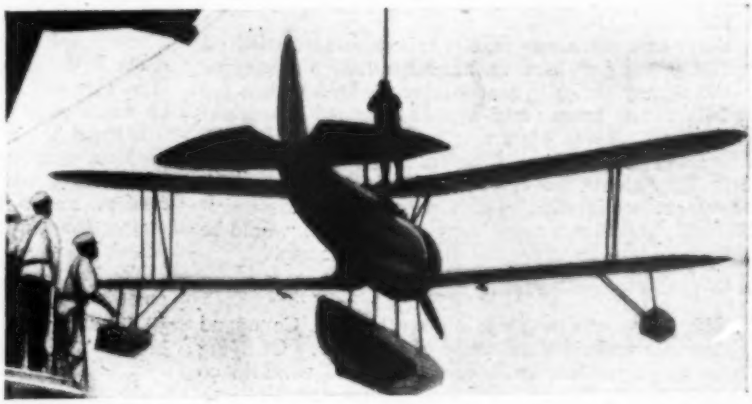
Cruiser Aircraft

Disregarding new tonnage, of which there is but scant information, the Imperial Japanese Navy has some 37 cruisers. These range between the *Nachi* of 10,000 tons down to the little *Yubari* (adapted for minelaying) of 3,000 tons. All above 5,000 tons carry aircraft, and most of them have catapults fitted. Twelve of the largest, between 8,500 tons and 10,000 tons, have two catapults each (placed abaft the mainmast in the British style and not on the forecastle deck as in the Italian manner), and four aircraft, while a further fifteen have one catapult and one or more machines. The remainder, with the exception of five, carry one seaplane each, which is lowered overboard by crane when required.

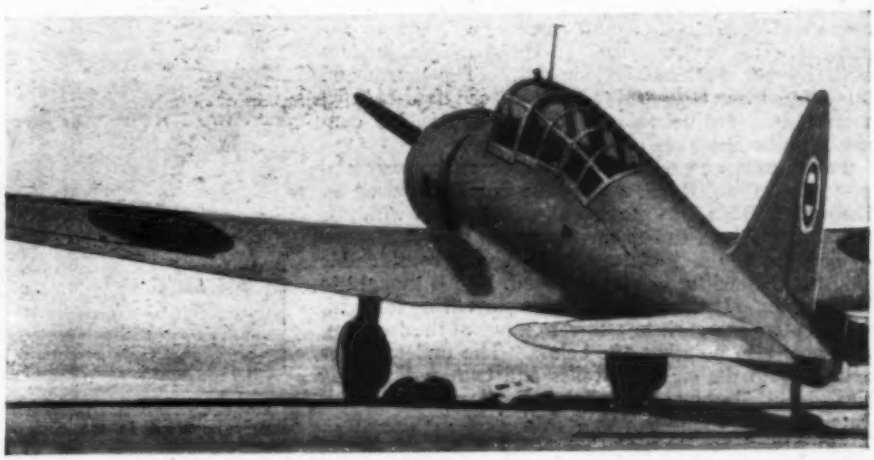
In rather the same manner as ourselves, Japan's aircraft carriers are equipped with air-

IN SQUADRON VIC: A formation of nine 4-engined flying boats belonging to the Imperial Japanese Navy.

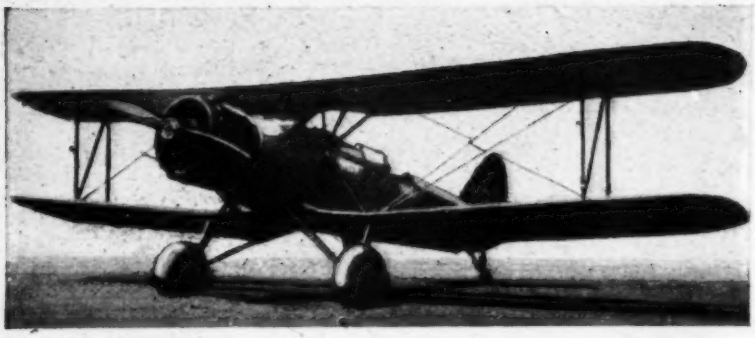
2596 MODEL: The Mitsubishi 96 monoplane fighter, which is contemporary with our eight-gun machines, has a top speed of 280 m.p.h. and a service ceiling of 31,200ft. Span, 36ft.; length, 24ft.; height, 10ft. 2in.



HOIST AWAY: Lifting a Navy 95 single-float seaplane out of the water.



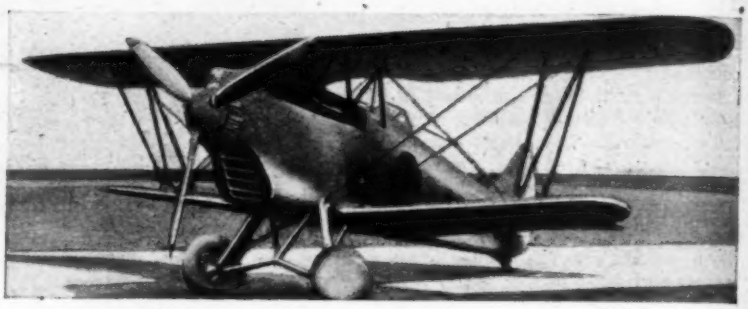
MODERN BOMBER: The Army 98 single-engined two-seater bomber developed from the Mitsubishi Karigane (Wild Goose), which flew from Tokyo to London in 1937.



JAPAN'S T.S.R. : A three-quarter front view of the Nakajima 96 carrier borne torpedo-bomber. The motor is a Kinsei radial of 950 h.p.

EASTERN FURY : The Kawasaki Army 95 single-seat fighter powered by a 600 h.p. B.M.W. engine built under licence by the Kawasaki concern.

NIPPON'S AIR POWER (Continued)



craft performing four major duties: fighting, dive-bombing, torpedo-bombing and reconnaissance. The last two duties are combined and carried out by a biplane designed in 1935. Fighting and dive-bombing are performed by the Mitsubishi 96, an all-metal low-wing monoplane common to both the army and naval air services. This fighter has two synchronised machine guns firing through the airscrew disc and is powered by a 550 h.p. Kotobuki engine (Bristol "Jupiter" built under licence by the Nakajima concern). It was one of these fighters, when operating in China, that had the major portion of one wing shot away and yet got home safely.

Shipborne machines, that is to say those carried on battleships and cruisers, are almost entirely of two types —the Kawanishi 94, a three-seater credited with a top speed of 140 knots, and a radial-engined two-seater single-float biplane known as the Navy 95. It is of interest to note here how these type numbers are arrived at. They are the last two numbers of the year in which they went into service. The Japanese calendar starts at 660 B.C., and thus a 1936 design, for instance, would be known as type 96, from the Japanese year 2596.

Flying Boats

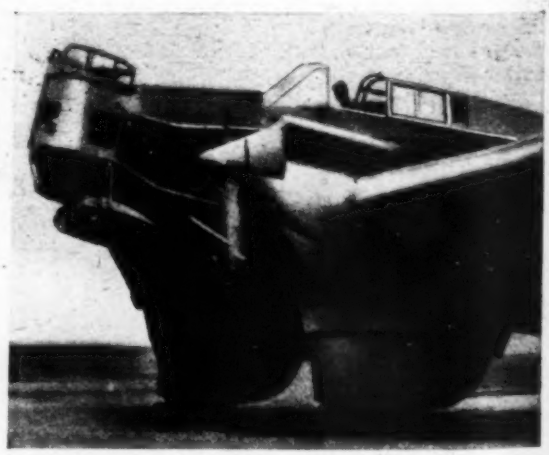
The Japanese equivalent of our Coastal Command also comes under the authority of the navy. Of flying boats there are four main types. The Kawanishi 90 (3 Rolls-Royce Buzzard engines), to all intents and purposes the Short Rangoon, built under licence from Short Bros.; the Kawanishi 91, a twin-engined monoplane boat with a Short-type hull; a third model, also all-metal and of Short-type hull construction, is a monoplane powered by three 650 h.p. Hispano-Suiza engines built by the Mitsubishi Company. The fourth and latest flying boat type is a strut-braced four-engined monoplane. No details are available of this, but considerable numbers are already in service.

For bomber operations from land bases the navy employs the Mitsubishi 96 monoplane bomber as used by the army. This is of modern all-metal design with two 1,000 h.p. Kinsei radial engines which give it a speed of between 240 and 250 m.p.h. A very considerable range is claimed for it, and the bomb load is thought to be 1,100 lb. It carries no machine guns firing forward, but has two firing aft in a turret on top of the fuselage, and one, also pointing aft, below. The undercarriage retracts into the engine nacelles and twin rudders and fins are fitted above the tailplane. A crew of five is carried.

On paper the Japanese navy and naval air service appear to have a high potential striking power, but it must be remembered that they have very little background in the way of naval battles. All this show of force has been obtained by apeing our Royal Navy. There is not, so far as we know, a single original design either in the ships themselves or the aircraft they carry. It is, therefore, reasonable to expect that there will also be a lack of original naval strategic thought.

If the time should come when there is a show-down in the Pacific, some interesting actions will be fought. The wide oceans are ideal for the employment of aircraft carriers, and both Japan and ourselves—and for that matter the United States—are strong in this type of vessel.

The relative strengths in aircraft carriers of the great naval powers was dealt with in our issue of January 9th. In addition to photographs a series of outline sketches of all the carriers in commission were included.



CASTLES IN THE AIR : The Franco-German influence is very apparent in the design of the Japanese long-range bomber of 1933.

AIR STRENGTHS

An American Engineer Examines the Air Fleets and the Production Rates of the Opposing Forces

Mr. T. P. Wright, the engineering vice-president of the Curtiss-Wright Corporation, which is one of the largest of the American firms supplying us with aircraft, has written a most authoritative article on that vital subject, the numbers of military aircraft being produced in U.S.A., Britain and Germany. By courtesy of the American monthly, *Aviation*, extracts from the article are given here for the information of our readers.

WE are, I believe, gradually reaching a realization of the fact that we will be called upon to an ever-increasing extent to defend our democratic way of life; our bill of rights; our freedom; and our right to consider every human being as someone of importance in himself, someone having an individual dignity, and the right of determining his own course in life, and not a mere cog in the machine of State—a robot. Effective national defense is an immediate insurance policy for a continuation of our course.

And yet, taking a longer view, some form of collective security holds the greater ultimate promise.

In 1919 the war was over, a League of Nations was being formed for the purpose of perpetuating peace with a united effort, and we were deciding effectively to defeat this effort by refusing to join the organization we had initiated, a group composed of Allies with whom we had fought. An irreparably grievous and uncourageous decision! Then in the 1930's aggression commenced; Japan seized Manchuria in 1932, unopposed by the other nations (England refusing to join us in a strong protest); Hitler came to power in 1933, heralding his future course by marching into the Rhineland in 1936 (France and England could then have stopped him); Italy attacked Ethiopia in 1935 (wholeheartedly applied sanctions could have stopped this aggression); the dictator nations used Spain as a proving ground for their weapons in 1936; Japan committed a brutal aggression against China in 1937; then in 1938 Germany assumed the aggressor's role in Austria and Czechoslovakia and appeasement was in full swing.

I hope it is clear that our most effective defense effort is and will continue to be to extend the maximum aid to Britain—to stop Germany. The rule-of-thumb airplane aid of one to Britain for one to our own Services should be increased all possible, perhaps to one and one-half or two for one. This can be done by proportioning properly the deliveries of trainers that we first need and the combat planes that England desperately needs. When doing this, it is believed we can still, under anticipated production delivery schedules, *meet the minimum aviation directive requirements set up by our General Staff.*

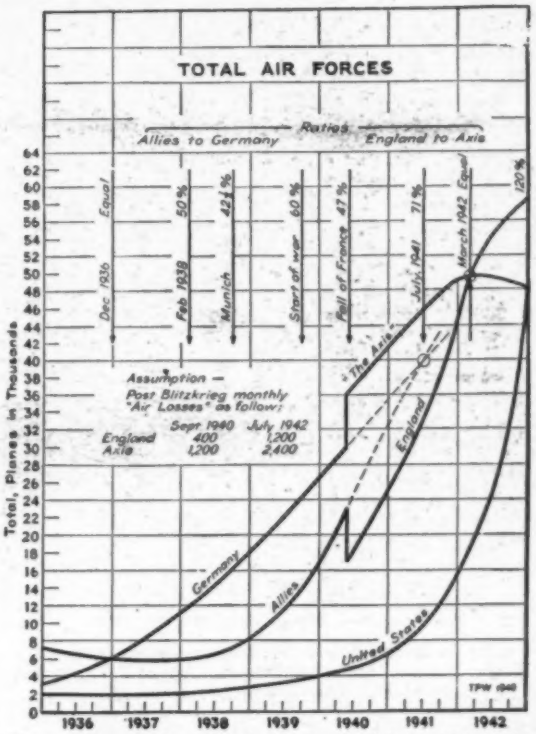


Fig. 1. Comparative numerical strength of the opposing Air Forces. Mr. Wright estimates that Britain has 28,000 aircraft opposed to the 43,000 belonging to the Axis at the present time.

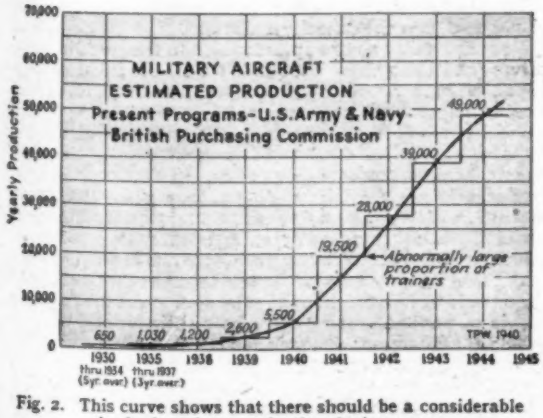


Fig. 2. This curve shows that there should be a considerable rise in American production during 1941.

Aircraft Production Problems

There are 12 or 14 distinct aircraft types required by the Army and a like number by the Navy. Altogether, there are about 45 models, representing distinctly different airplanes, in the present program. There are several models developed especially for the British, differing substantially from our own. Thus we are at present producing about 50 differing models. Attempts to standardise are under way, but the diversified and specialized military uses of aircraft are such as to make it unlikely to reduce the number to less than 40 without seriously affecting military efficiency.

Simply stated, our problem is to produce the greatest number of military airplanes in the shortest possible time. The graph of Fig. 2 illustrates the magnitude of the task. The anticipated 1941 production of 19,500 planes is greater than indicated by the trend curve because of a larger proportion of training planes. Otherwise, the trend curve represents about what I feel may be expected.

To get to an objective of 50,000 planes a year, present productive floor space for airframes must be increased from 14,000,000 to 40,000,000 sq. ft., with 28,000,000 sq. ft. capacity production in May, 1942. The corresponding size of the productive labor force for the three periods are respectively, 120,000 and 400,000 and 280,000. Counting in instrument and equipment (but not armament) factories, and adding in total non-productive floor space and personnel, we find that the aircraft industry, to produce

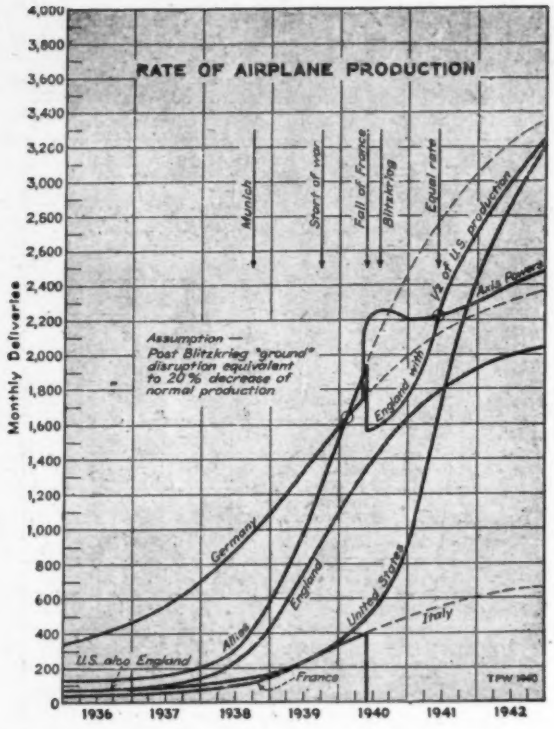


Fig. 3. In these curves of rates of aircraft production Mr. Wright indicates that Britain, with the help of U.S.A., should equal Axis production by July of this year.

50,000 military airplanes a year, will require about 90,000,000 sq. ft. of floor space and 800,000 employees.

The mere expansion of factories and numbers of workers is thus seen to be a tremendous task, but this is only part of the whole problem. Another such part is the equipping of the factories with *machine tools*. Training the labor force required in the time allowed can only be accomplished if we use true "production" methods, which contemplate use of large, expensive and accurate machine tools.

If the number of different models is 40 to 50, then for a 50-000-planes-a-year program the average yearly production for any one type will be about 1,000. Several automobile companies are capable of turning out up to 2,000 units each day. So the airplane industry, in terms of potential mass production, is of the order of one per cent. of the automobile industry. Different methods must therefore be expected. True production methods, however, are used now and will be used increasingly. It is a disservice to the country to mislead those not aware of these facts by giving out rash statements on "1,000-per-day" airplane production rates, as these are unattainable by great motor-car producers or anyone else.

Balanced Production

A further production problem is that of *quality*. This refers both to insistence on high standards of workmanship, material and finish, and to design excellence from the standpoint of performance, armament installation and general military usefulness. Perhaps the severity of some specifications can be reduced, but it is not believed wise to "let down the bars" a great deal, if at all. There is a need, however, for avoiding delays brought about by duplicate Government and company inspection.

The really difficult quality problem in an industry based on a rapidly developing art is ever to get true large quantity production of a product that always requires optimum *design excellence*. Reports from England consistently emphasize this fact. The marked superiority in the fighter class of England's Spitfire and Hurricane, and of the Wellington and other bombers, over planes of their German adversaries, accounts in part for the superlative morale of the young pilots of the Royal Air Force, who have saved the day for Britain (and as well, saved civilisation). This striving for design superiority, necessitating introduction of changes to new models, automatically sets a limit on production quantities.

AIR STRENGTHS (Continued)

The problem of attaining *balanced production of airframes and engines* is most difficult. Some indication or measure of this disparity is the cost of new facilities for the two industries: engines approximately $20 per sq. ft. of productive floor space (including tools), and airframes $8 per sq. ft. Thus a serious bottleneck in engines has already been encountered and will for some time persist. Another is the need for spare engines (in addition to engine spare parts) coupled with the fact that many airframes require more than one engine. Actually, there are just over two engines required for the average military airplane.

The present contracts, including commitments to the British, point to an Army Air Force of about 18,000 planes and for the Navy of about 7,000. Instead of completing the construction of approximately 40,000 planes (15,000 for the British) by the spring of 1942, the date will be in the summer of that year, and instead of attaining an industrial capacity by that time of 40,000 planes a year, it will be about 30,000. Thus the 50,000-plane Air Force and 50,000 plane-per-year industrial capacity is far ahead.

Air Strengths

In a previous article (summarised in *Flight* of April 25th, 1940) I showed pre-blitzkrieg estimates of relative air strengths. Since then Italy has joined the conflict; France, by defeat, has left the Allies; the United States has accelerated its production and its deliveries to England; and plane losses, both "in the air" and "on the ground" have greatly increased. The revised estimates are shown in Fig. 1 and Fig. 3. As before, total air force includes all types of planes, proportioned approximately as follows:

First-line combat (fighters, bombers)	30 per cent.
Co-operation planes (reconnaissance, cargo, observation, utility)	15 ,, ,,
Reserve (all tactical types)	25 ,, ,,
Training planes	30 ,, ,,

It will be noted that *equality of production rate* is estimated for the middle of 1941 as against the first of 1940, pre-blitzkrieg conditions. *Equality of total Air Force* is estimated for the spring of 1942 as against the summer of 1941. The entry of Italy and the fall of France weighed heavily in Germany's favour. In the initial all-out attack on England, German plane losses were three times those of England, and personnel five times (average of the first eight weeks). This disparity is now less. Fig. 3 assumes that the 3:1 ratio will reduce to 2:1 by July, 1942. Ground losses for the two adversaries are assumed equal at 20 per cent. normal capacity reduction.

Assuming fairly close approximation to the truth in these curves (and I can claim no more), we see the tremendously important part played by our deliveries to England. If we meet or improve the rate shown, England will win.

We have before us constantly the spectacle of a war, brutally waged and directed indiscriminately by the Axis powers against combatants and non-combatants; against ideals; and against the whole philosophy of democratic institutions. We are seeing daily the glorious stand of England with her few Allies, fighting with undaunted courage. What more courageous epics has history to offer than those we have witnessed: the defeat of the Graf Spee; the miracle of Dunkerque; the calm courage of the common people of London, arising daily from their air-raid shelters to find their homes destroyed; the stand of the Jervis Bay, unarmoured and out-gunned, and finally, the Royal Air Force, whose boys willingly and smilingly engage in combat any number of enemy planes. These boys, fighting the good fight for civilization, deserve all we can do.

Air Strategy—XLII

GREECE and ALBANIA

Lessons of the Tactical Employment of Fighters and Bombers in the Present War—V

By CAPTAIN NORMAN MACMILLAN M.C., A.F.C.

UNLESS one has visited a country, or better still (from the pilot's point of view), flown over it, preferably in the pilot's seat, it is difficult to appreciate precisely what that country looks like from the air. There may be some readers who will exclaim, "But why the pilot's seat? Surely one gets the same idea from behind the pilot?" Personally I do not think that any member of an aeroplane's crew or passenger list gets the same idea of a country below as does the pilot. The individual in the nose cockpit of a multi-engined aircraft obtains the nearest approach to the pilot's outlook, but he looks upon the terrain below (and in mountainous country, sometimes alongside, or even above) as the man who is being transported over, past, or below it, and that is fundamentally different from the aspect seen by the man who has the responsibility for the aircraft in his hands, feet and brain.

I had this difference vividly brought home to me one day when I was a passenger in an airliner, cruising sweetly enough through narrow Swiss valleys with about 8-10 cloud intermittently covering the mountains. It appeared positively frightening, from the restricted outlook of the passenger window, to see walls of rock so steep that no snow could cling to them flash into view, and then next instant disappear in dense cloud at what seemed like half a wing's span from the wing-tip. But, up in the pilot's cabin, with its hemispherical vision, it was easy to see that the valley ahead was opening out and that there was ample room to fly blind for a few seconds, if not for minutes. The passengers' view was that of vertical walls of unfriendly rock; the pilot's was the vista of a friendly valley with a carpet of snow below and a stream cutting a black course through it, and ahead journey's end. The passenger seldom sees the journey's end until the pilot is curving round in preparation for the landing.

As the Pilot Sees It

And so it is that I would hesitate to write anything about Greece and Albania unless I had seen both countries from the air. They are wild and mountainous, especially Albania. Mountains in Albania build up to a plateau, above which rise the peaks. This difficult country runs south to the Gulf of Corinth, where the rock walls fall sheer into the sea. Off the coast of the Ionian Sea the rocky islands guard the shore south of the tadpole-shaped island of Corfu, with an occasional beach on which one might land. Around Athens the country is one of barren mountains and rounded valleys. The land appears singularly bare of vegetation. In season it is the habitat of the flea. Beyond, rock islands rise from the water as though one of the mythological giants had gleefully scattered a handful of (to him) pebbles in play. In Crete the mountains rise to 7,000 feet Away up by Valona there is an area of flat land and sand by the shore, but inland it soon rises to the frozen waves of hills.

Most pilots who have flown over that territory in hot weather have remarked that it is one of the bumpiest bits of Europe, and that probably means the world. It cannot be less bumpy when the winter storms howl round the mountains and whistle down the gorges that cut a passage through the elevated plateau. A less pleasant land in which to carry out air operations in collaboration with fighting troops engaged in war is scarcely to be imagined.

It was against the most difficult part of this country that the Italian attack was launched. The Italians had made no preparations for "quisling" Greece before the assault. And, compared with the German invasion of Norway, the Italian "invasion" of Greece was like the same operation turned upside down. To obtain the same facilities for the invasion of Greece as the Germans possessed for the invasion of Norway, Greece should have been invaded from the south. The initial attack should have been launched against the Piræus and Athens as the Germans launched their first attack in Norway against Larvik and Oslo. But Italy could not do that. Germany had the sheltered waters behind Denmark through which to move her forces against Norway. Italian forces could have reached the Piræus only by running the gauntlet of the British Mediterranean fleet, and their line of communication would have had to be maintained by sea.

The Short Cut

Success in this operation could have been achieved only by seizing the island of Crete, and thereafter maintaining Italian control of the middle Mediterrannean bounded by Sicily, Tripolitania, Cyrenaica, Crete and the Dodecanese. Instead Italian strategists ignored Crete, chose the short sea line of communication across the Adriatic between Bari and Brindisi and Durazzo and Valona, and attempted to invade Greece from the "Narvik" end of that country. The Italian strategy was apparently an attempt to try to obtain by threat what Italy was afraid to obtain by action. Had Greece succumbed to the fiat of Italy, Italian forces would no doubt have moved into Crete (if the British had been prepared to acquiesce dumbly, which I doubt). The Italians are not good at poker. Their bluff was quickly called, and from the very beginning what they sought to get by threat and what they ought to have got by force if they were to succeed at all was at once lost to them by the British response to the Greek request for assistance, and by the occupation of Crete by British forces, which cut off the Italian forces in the Dodecanese, leaving them as beleaguered garrisons instead of outposts of an Italian empire.

British assistance to Greece then took the direct form of air and naval aid, the delivery of war supplies and, later, the indirect aid of the Middle East offensive. Here we are concerned with the air side of the help rendered. The strength of the British air forces operating with the Greek army has not been disclosed, but that it cannot be very great is denoted by the appointment of an officer of the rank of Air Commodore as Air Officer Commanding. It must not be thought that the comparatively small size of the British air forces directly employed in the Italo-Greek campaign is due solely to British incapacity to do more; nothing could be more dangerous than such an outlook.

Whatever may happen as a result of German pressure in the Near East, the original Italo-Greek front was small and the few possible routes of thrust defined by the configuration of the country. The throat through

GREECE AND ALBANIA (Continued)

which the Italian forces had to pass between the Ionian Sea and the frontier of Yugo-Slavia was 100 miles across; now, since the Italian forces have been driven back by the Greek troops, it is no more than 80 miles across; thus the demand for air co-operation with the Greek forces has not increased, but, if anything, it ought to have decreased during the first four months of the campaign. For these reasons the possibility of deploying a large air force for direct assistance to the Greek army did not exist, and has since diminished. (A German move southward from Rumania will, however, modify this position instantly.)

Nevertheless, the small British air force allocated to assist the Greek army has carried out important co-operative work in the bombing of road bridges, transport, troops, and ports, and has proved of material help to the Greek air force. But the employment of bomber forces against Italy has had a different aspect since the beginning of the Italo-Greek war, and it is impossible to confine the consideration of British air assistance in this campaign to that of the direct help rendered to the Greek army.

Viewed from the larger strategy of the war as a whole, the Italian attack upon Greece enabled British air forces to engage upon a wide air offensive against Italy, which gave indirect asistance to Greece, perhaps more vital in its effect than the more direct assistance of the army co-operative units. This indirect aid was the outcome of the ability of the British air forces in the Middle East to move a portion of their strength on to Greek soil for operation against the Italian mainland. Southern Italy was thus brought into range of British shore-based aircraft for the first time since the Italian declaration of war against Britain on June 10, 1940, one of the calamities which her ultimatum to Greece had been designed to prevent.

It was thus possible to attack the long peninsula of the Italian mainland at both ends by shore-based aircraft operating from Britain and from Greece, and that enabled Britain to threaten every port of importance in metropolitan Italy. In addition Britain possessed the elusive mobile air strength of the Fleet Air Arm operating from carriers based in the Mediterranean. The action of the Fleet Air Arm Swordfish torpedo-planes against the Italian fleet in Taranto harbour is one of the classic episodes of the war in the air. How great a part it played in the freeing-up of the Mediterranean has not yet been officially stated, but it is perhaps significant that since that operation (and others) the British Western Mediterranean fleet appears to have become

GREECE AND ALBANIA (Continued)

a more potent force in the Middle Sea; and it was after that disaster to the Italian navy that the German dive-bombers were moved down to Sicily.

Here it is important to note that air action has achieved more against the Italian fleet than sea action. There are two reasons for this: (1), the superior speed of aircraft over ships enables aircraft to bring ships to action when surface vessels are unable to do so because of their speed limitation; (2), aircraft are not deterred by a minefield as are ships, nor by submarines. Thus, when considering the vulnerability of warships to attack from the air, the fate of the Italian naval units at Taranto must be included in the calculation; the fact that torpedoes were used from aircraft operated by the Royal Navy does not affect the issue.

Naval Objectives

It is evident from a consideration of the targets which were mostly attacked from the air—in Southern Italy and Sicily—that the objectives were mainly naval in character, and designed to break the objectives which Italy must have had in view when her ultimatum to Greece was delivered. British determination to control the waters of the central zone of the Mediterranean Sea was greater than the Italian. In the north of Italy occasional air attacks were made from Britain against isolated targets, including the neighbourhood of Venice, at Porto Marghera, Trieste and Fiume. Ancona, an important port on the Adriatic, has not been touched, nor have its two important feeder railway junctions at Piacenza and Bologna. Brindisi, farther south, has been attacked, as has Naples, principal port of the Tyrrhenian Sea, several times.

It is thus possible to see part of the strategy which lay behind the tactical employment of bomber aircraft used against Italy since the opening of the Italo-Greek campaign, made possible raids by shore-based aircraft against Southern Italy. Primarily it has been aimed at the denying to the Italians of the seaway communications outside the immediate and local neighbourhood of metropolitan Italy, and the destruction of Italian naval power.

To these attacks Italy has been unable to make any effective retaliation. The way was paved for the greater freedom for naval co-operation in the Western Desert offensive. Indeed, some of the air attacks made against Italy appear to have formed a part of that offensive. And, in turn, the Italian failures against Greece and Egypt have turned a large part of the German forces to the Near East, so that a new phase of the campaign in the Eastern Mediterranean has been (shall we say) precipitated by the method of warfare waged by the combined British forces in that vast, and classic, theatre of war.

In spite of her reverses, it must not be thought that Italy is tottering to a definite collapse. It is known that the results of the application of sea power are not quickly gained. Pressure by sea is a slow process. While Italy has been strangled, she has not been killed as an enemy, yet. While we have been busy amputating the extremities, we have paid too little attention to the trunk and heart. Metropolitan Italy was susceptible to severe internal punishment by air attack from Britain and Greece ever since she entered into hostilities with Greece, but British bombers have not been tactically employed to that end. Instead they have been put to a dual use. One of these uses is to play a definite part in increasing the pressure which can be brought to bear upon our enemies through sea power; the other is to line up in the actions required by the combined forces in land warfare.

After all, you have to cut your suit to fit your cloth. The most had to be made of the air forces which were at Britain's disposal for use in and about the Mediterranean. And to that end Britain's bombers were employed in co-operating with the Greek army in Albania and the Imperial army in the Western Desert. In both, local air supremacy was attained by brilliant fighter action clearing the way for the bombers. The bombers and torpedo aircraft which could be spared from those duties were deflected to seek out targets planned to assist the supremacy of the Allies' sea power, and they, too, have achieved local supremacy. Presumably the one reason why virile and numerous air attacks were not made against the metropolitan area of Italy as a general target was lack of aircraft at that time to do everything at once.

But the time will come when that can be done, and then the additional weight of independent air power, applied as our independent sea power has been applied against Italy, will extend the tactical employment of our bombers in the Mediterranean to hasten the defeat of Italy by direct action against her metropolitan territory.

To do that, however, it is imperative that the bases which are available in Greece shall be secured and manned for the purpose. If they were to be captured by German forces driving through Bulgaria and Yugo-Slavia the whole position of Italy would be altered overnight. The capture of Cyrenaica or even of Tripolitania as well would not compensate for the loss of aerodromes on Greek soil. And if we were to be driven from Greece for any reason we should have lost the opportunity, the golden opportunity, we possessed in the winter months of 1940-1941 to attack all metropolitan Italy from the air. That, combined with the pressure in Albania and the Desert, would have been too much for her. We ought to have concentrated our air strength more on metropolitan Italy. We ought to have done everything we could to make a German drive through Bulgaria and perhaps Yugo-Slavia this early spring useless; but we have not done so.

Sauce for the Goose

Remember what Mr. Churchill said some time ago, and he repeated it in his recent broadcast, that even if Hitler stood at the gates of India it would profit him nothing if Germany were pulverised at home. Surely the same thing applied to Italy? Is the process which is sound for the senior partner not also sound for the junior?

The lesson we ought to learn from the tactical employment of aircraft in Greece is that we do need, and need badly, a mobile Bomber Command which can be despatched to any theatre of war to take independent action in that theatre as a strategic air force, so that at no time shall all our air forces have to be deployed to serve only the ends of the immediate military or naval situations. If the navy needs control of the Coastal Command, and the army needs the Army Co-operation Command, then the air force certainly needs more than just one Bomber Command stationed at home. It needs a Bomber Command wherever the opportunity arises to employ aircraft in the major strategy of this, the greatest war of all time.

(Next week: The Middle East Defensive.)

THE AIRCRAFT ENGINEER

No. 180 16th Year.

HEAT FLOW IN ENGINES

Thermal Energy a Two-edged Weapon : Some Fundamental Factors Examined

By EDWARD A. SMITH

THE progress of air-cooled and liquid-cooled engines side by side in aircraft must prompt, at some time or another, in the minds of readers the question as to whether there are any radial differences between the two in the way they convert thermal to mechanical energy. Fundamentally, however, they are the same, this applying also to designs operating on sleeve or poppet valves. Useful though it may be, thermal energy is a double-edged weapon in which both blades are too keen for convenience. This fact seemed to stand out when the writer glanced through a paper which he gave to the Institution of Automobile Engineers on the subject a few years ago. One might say, indeed, that thermal energy is very intractable, which may account for the internal combustion engine being at best a poor job from the point of view of thermal efficiency.

When petrol vapour is oxidised, or exploded, in the cylinder the molecules of hydrocarbon which constitute the fuel are converted into carbon and water vapour, forgetting for the moment fuel dopes or impurities. The potential energy of the fuel is converted almost completely into thermal energy, which is made up of three components : that due to translation of the molecules, to molecular spin and to molecular vibration. It is the difficulty of converting all of this energy into the mechanical form which explains why the thermal efficiency of an engine is less than 30 per cent. Nearly 60 per cent. of the calorific value of the fuel put into the unit is lost as heat, facilities having to be made for the rapid disposal of the latter to keep the temperature of the engine within working limits. It is this last requirement which gives rise to the problem of air or liquid cooling, and which inspired the sentiment about heat being a two-edged weapon.

The Radiation of Heat

The heat of an explosion passes to the cylinder wall by radiation and convection, and while the convected gas depends on such factors as turbulence, the amount of heat radiated is governed by the Stefan-Boltzmann relation

$$E = 5.32 \times 10^{-5} (T_1^4 - T_2^4)$$

E being in ergs/sq. cm./sec.

In practice the amount increases with engine speed and Gibson's expression for 2,000 r.p.m. is

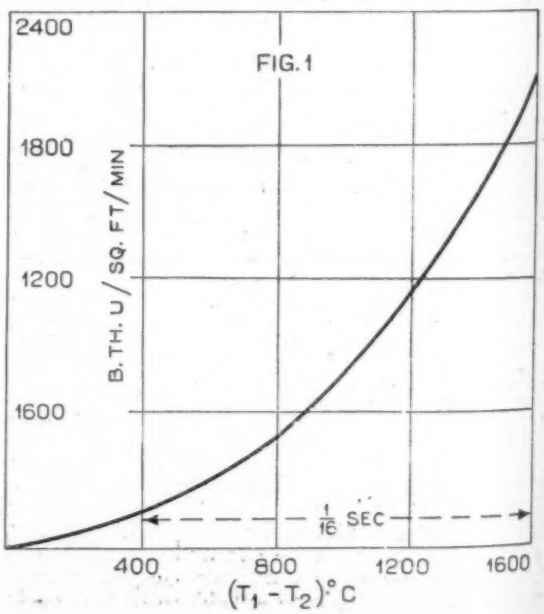
$$E = 2.3 \times 10^{-12}(T_1 - T_2)^3 \text{ ergs/sq. cm./sec.}$$

and at 200 r.p.m. it falls to one-third of that for the higher speed. The temperature of the explosion will rise from a minimum to a maximum and fall back, so that a rapid cyclical variation occurs with each power stroke. This causes the heat flowing to the cylinder wall to vary harmonically, the frequency following the engine speed.

One can calculate approximately the amount passing to the wall by this means, and Fig. 1, constructed from values based on the above formulæ, show the variation when the temperature ranges from 0 deg. C. (theoretically) to about 1,600 deg. C., in B.Th.U. By simple extrapolation it can be seen that, for a value of 2,000 deg. C., the heat flow at the moment of that temperature is about 3,000 B.Th.U.

Having reached the cylinder wall, either by radiation or convection, the heat has now to pass through the former and here we are confronted with the second stage in cooling, which tends to be, theoretically at least, more complex. It is obvious that if the heat flow to the wall is cyclical, the temperature at the surface of the latter will vary. Furthermore, as the flow of heat through the wall depends entirely on the temperature gradient on either side it follows that the amount of heat passing to the outside will vary, with certain qualifications. At this juncture we reach an interesting stage in the subject, for while the heat flowing into the wall will have a relatively large amplitude of variation, a damping action on the wave form is exerted by the metal. The result is shown diagrammatically in Fig. 2, where it is seen that the amplitude falls away rapidly as the heat passes into the cylinder wall. The variation, formerly harmonic, must now be treated as a Fourier series, which for the benefit of those who may have forgotten their earlier mathematics, may be described as a method of resolving a number of different harmonic series.

There is an expression, well known to heat engineers, which enables the temperature at any point in the cylinder wall at a particular instant to be calculated, or, in other words, we can find the point at which the heat-flow is sufficiently damped to be sensibly constant. It is necessary to know the specific conductivity of the cylinder wall

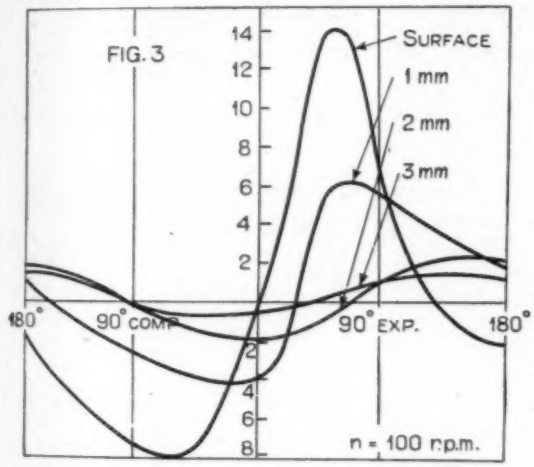


HEAT FLOW IN ENGINES (Continued)

material, its diffusivity, density and specific heat, the amplitude of temperature variation at the surface and frequency. These are connected by the Callendar and Nicholson formula

$$V = ae^{-x\sqrt{\frac{\pi n}{K}}} \sin\left(2\pi nt - x\sqrt{\frac{\pi n}{K}}\right) + \frac{V}{b}x$$

where the diffusivity, K, is equivalent to $\frac{k}{Ds}$, k being the coefficient of conductivity, D the density and s the specific heat of the cylinder wall material, while "a" is the amplitude, at a depth "x" in the wall. The value of the whole expression is governed by the factor $ae^{-x\sqrt{\frac{\pi n}{K}}}$ and if one substitutes known values in this one can construct a graph showing the influence of engine speed on the depth in the wall at which a certain amplitude in heat flow or, more exactly, temperature is attained. But more striking is the diagram constructed by Mr. Robert Sulzer, in a paper of his to the Institute of Naval Architects, March, 1926, shown in Fig. 3, illustrating the variation at different depths.



Periodic variation of temperature in a cylinder wall (R. Sulzer).

The decrease in amplitude as the heat passes into the wall is striking, and, as one might imagine from consideration of the theory touched upon the above paragraphs, the tendency is for the heat flow to level out, so to speak, and lose its wave-form nearer to the surface with increasing engine speed. The depth at which this occurs is dependent on the wavelength of the heat, or temperature swing, and calculation shows that, for an engine speed of from 400 to 3,000 r.p.m., the distance from the inner surface of the cylinder wall at which the temperature assumes a sensibly constant value varies from about 0.2in. to 0.05in. respectively.

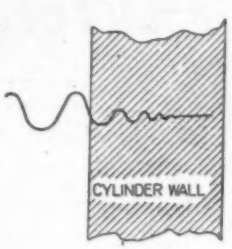


FIG. 2

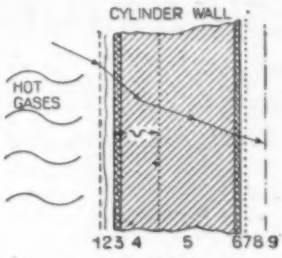


FIG. 4

The numerals in Fig. 4 indicate: 1, static gas film; 2, oil film; 3, oxidised metal surface; 4, zone of cyclical variation of temperature; 5, normal zone of cylinder wall; 6, oxidised metal surface; 7, gas or air film; 8, static layer of cooling liquid; 9, cooling liquid. (The thicknesses are not to scale).

Readers who have not had the opportunity to consider heat flow in detail may be excused for thinking that, from the thermal point of view, the cross-section of a cylinder wall is uniform. Fig. 4 will dispel this idea, it being seen that there are several barriers to heat flow. Each barrier, or obstruction, if you prefer, means a different temperature gradient down which the heat has to flow. Incidentally, any confusion between temperature and heat, which may arise in one's mind, can be removed by considering the former as analogous to voltage, and the latter to amperage. It is true that the cylinder wall proper is uniform in its heat conductivity, but although the other barriers may be thin in comparison they exert an important influence on heat flow. Consider, for example, the oil film on the inside of the cylinder; even though it may be a full fluid film, as the lubrication folk call it, and therefore less than a hundredth of an inch thick, it may constitute as large an obstruction to the flow of heat as the whole depth of the cylinder wall, because the thermal conductivity of oil is several hundred times as small as steel or cast iron. The gas film, again, may be extremely thin, but as its conductivity is several thousand times as small as the cylinder wall material, and; consequently, it plays a part in holding up the ready flow of heat from the inside of the cylinder to the cooling air or liquid.

Fig. 4 takes no account of a sleeve-valve engine, but a moment's consideration will show several more barriers. Due account is taken, of course, by the designer of these factors, and given adequate lubrication of the sleeve-valve, they do not present any serious problem.

Having followed the flow of heat from its source to the outside of the cylinder, one arrives at the cross-roads, for the question at issue is then: how shall one draw off the heat as it reaches the outside of the walls? And so we get air cooling and liquid cooling, but if air and liquid are considered simply as "fluids," to use the expression of the physicist, the underlying theory relating to this aspect of engine cooling is seen to have a basis common to both methods. It is, nevertheless, a subject which space precludes from dipping into, and might usefully form the subject of a separate article.

AMERICAN PRODUCTION

THE Washington correspondent of the *Wall Street Journal* says that ambitious plans for the expansion of the American aircraft industry are being discussed. A British order for 12,000 more aircraft, largely bombers, and an expansion to a capacity of 42,000 aircraft per year are believed to be in the plans. Lord Beaverbrook's statement in the first half of 1940 was to the effect that he had made arrangements for U.S. production to be expanded to 3,000 per month, so these present discussions seem to be merely further attempts to turn past plans into actual fact. They simply bear out the contention expressed in *Flight* at the time, that the 3,000 per month would take several years to materialise.

But American production is rising, for Mr. W. S. Knudsen states that 1,036 aircraft were manufactured during January and that 957 of these were delivered to the U.S. Army and Navy and the British Purchasing Commission. (It is presumed that the remainder were exported abroad, and it is also presumed that the figures apply only to military craft. Production of civil craft has been at the rate of 505 per month during the first nine months of 1940.)

Service Aviation

Royal Air Force and Fleet Air Arm News and Announcements

Intensive Tests

ACCELERATED tests are being carried out on the new American military aircraft types now in production for the United States and ourselves. Periods of 150 hours' intensive flying with full military load is expected to bring any minor snags to light in time to incorporate the necessary modifications before delivery.

Naval Aircraft Production

ADMIRAL SIR NOEL LAURENCE has been appointed Chief Naval Representative in the Ministry of Aircraft Production. He will have as his staff a captain R.N. as Director-General of Naval Development and Production, and a small staff of naval officers. The new organisation will be responsible for watching the development, production and supply of naval aircraft and aircraft equipment.

Polish Decoration

HIS MAJESTY THE KING has granted unrestricted permission for the wearing of the undermentioned decoration, conferred by the Polish Government, in recognition of valuable services rendered in connection with the war:—

KRZYZA WALECZNYCH (CROIX DES VAILLANTS).

ACT. WING CDR. VISCOUNT A. P. H. FORBES, R.A.F.V.R.

F.A.A. Air Crews

MEN between the ages of 18 and 28, including those registered under the National Service (Armed Forces) Act, but not already posted, and those about to register in the near future are reminded that if they wish to be considered for pilot or observer in the Fleet Air Arm they must volunteer for such at any Combined Recruiting Centre, the address of which may be obtained from any Employment Exchange. Candidates (who may volunteer whether in a reserved Occupation or not) should have attained a general standard of education up to that of the School Certificate, and should have a good knowledge of elementary trigonometry and mechanics.

Capt. H. Balfour's Tribute

CAPTAIN HAROLD BALFOUR, M.P., Under-Secretary of State for Air, when inspecting an initial training wing of the R.A.F. recently, said: "I am convinced that the material we have today is fully worthy of the example handed down by the pilots and crews who so decisively won the Battle of Britain last September. There are now opportunities for young men between the ages of 18 and 32 to develop and show their qualities of courage and leadership and to emulate in the air the exploits of our greatest soldiers and sailors on land and sea as no other country can show. It has been said of Drake that he made the preparations of the enemy foolish by rising from height to height of daring until the very wind of his name cleared the seas before him. Surely it will be said of our airmen that the very wind of their name cleared the skies before them."

Many Thanks

A MEMENTO commemorating the recent presentation of a souvenir to the Nizam of Hyderabad has just been received by No. 152 Fighter Squadron. It takes the form of a volume, recording the ceremonial handing over to His Highness of a trophy taken from the first German aircraft shot down by the Hyderabad Fighter Squadron. Mr. C. H. Gidney, Resident at Hyderabad, handed over the trophy on behalf of the Air Ministry. The trophy is the hub and one blade of an airscrew from a Heinkel IIIK.

No. 152 (Hyderabad) Fighter Squadron was formed at the outbreak of war by a gift of £100,000 from the Nizam, supplemented a few month later by a further gift of £50,000.

Skilled Clerks

SKILLED clerks who have not yet registered for national service and who are not eligible for air crew duties are being accepted by the Royal Air Force as general duty clerks. Many of the men now being enrolled will be stationed at operational squadrons. They must be willing to serve at home or abroad and there are good chances of promotion for those who enlist now. Men for this work are accepted up to the age of 50 if reasonably fit.

They should have a knowledge of typing, but a certain number of men are being accepted without this qualification if they are likely to prove adaptable to Service methods. All the resources of the Royal Air Force for recreation will be at the disposal of the new recruits, and they should find life at a station cheerful and healthy. Even if a man has registered, but has not expressed a preference for the Royal Air Force, he can still express such preference unless he has been posted to the Army.

Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

DISTINGUISHED FLYING CROSS.

Flt. Lt. H. G. GODDARD, R.A.F.V.R.—No. 219 Squadron.—This officer has been employed in night flying operations since December, 1939. One night in November, 1940, he destroyed a Junkers 88 after attacking it at point-blank range at a height of 20,000 feet. His determination to seek and destroy the enemy at night, often in adverse weather conditions, has been an inspiration to his fellow-pilots.

F/O. P. S. B. ENSOR.—No. 23 Squadron.—This officer has participated in numerous engagements against the enemy, including three at night. He has at all times displayed great skill and keenness over a long period of operations, and has contributed largely to the high standard of morale obtaining in his squadron.

F/O. D. A. WILLANS.—No. 23 Squadron.—This officer has completed forty-four operational flights by night, and four sorties to Northern France. One night in January, 1941, he displayed great courage in attacking an enemy aircraft over the aerodrome at Poix, continuing his attack down to 500 feet, although aware of the heavy anti-aircraft defences at this aerodrome. He has displayed great coolness and zeal in the performance of difficult and dangerous duties.

LONG SERVICE AND GOOD CONDUCT MEDAL.

THE Long Service and Good Conduct Medal has been awarded to the undermentioned airmen:—

WARRANT OFFICERS.

W. A. Adshead, A. J. Akhurst, J. E. Ann, F. T. Baynham, A. Bingham, S. E. Craig, F. E. Craven-Griffiths, R. V. Crook, L. A. Dawson, S. J. Fenton, C. A. Fiddick, P. Floyd, F. W. Gillham, R. A. Harding, J. Harvey, J. W. Henley, J. Hickling, R. Hill, W. H. F. Holroyd, E. J. Irish, S. H. Jordan, F. C. Kirby, A. P. Lemmon, S. H. Nightingale, N. L. Pilfold, A. G. Rickard, A. Scott, A. B. Stevens, A. F. Tongue, R. Wright, D.F.M.

FLIGHT SERGEANTS.

J. A. Baker, L. A. Ball, A. G. Barrett, E. D. Bath, G. W. J. Begen, A. A. A. Bennett, S. G. Betty, D.F.M., L. H. Blackler, A. M. Blackman, E. V. Bowen, D. F. C. Bracken, C. Brotherton, C. W. Buckingham, G. T. Cant, W. Carter, C. Chandler, H. G. Christmas, A. F. G. Coke, H. T. Courtney, W. H. Cox, E. D. Cross, A. E. R. Cunningham, E. W. Curtis, L. Dandy, N. R. Donbavand, H. E. Dunn, S. G. P. Ellender, A. England, V. H. Everett, J. J. Fraser, L. M. Funnell, G. J. Gibbons, E. F. Gibson, A. N. Girling, T. Green, A. T. Griffiths, D. L. Grout, D. R. Hart, F. J. R. Heaps, W. A. Heddle, T. E. Hogan, A. E. P. Honeychurch, T. L. Hood, C. H. Hopper, H. H. Horsham, A. J. Hurlston, E. A. Ingroville, L. T. James, W. H. Jennings, A. Johnson, A. F. Jones, F. R. Langhorne, J. T. Letley, J. H. Lodge, E. R. Luscombe, W. R. Luke, W. A. Macintosh, A. McRae, W. H. Mann, L. J. Mansford, J. Manton, E. W. Marsh, L. G. Miller, H. F. B. Mills, R. J. Nash, A. J. Park, J. C. Pettitt, J. R. Porter, C. F. Povey, I. Price, B. Ravenhill, A. J. Reeves, F. L. Rich, R. J. Robinson, G. Robson, N. J. Rowe, G. Rowlands, L. W. Schulkins, G. Scott, L. S. Shore, J. P. H. Simmonds, J. E. Smith, W. G. Spencer, J. H. Styles, W. G. Sugden, J. H. Tee, A.F.M., L. H. Thompson, E. C. Thorpe, A. G. Todd, J. Vass, F. J. Walters, A. Ward, S. M. Wellard, I. W. White, S. C. White, W. E. Wilby, T. H. J. Wilkinson, A. E. Williams, H. Williams, R. Williams, B. G. T. Wormell, A. E. Yelland.

SERGEANTS.

G. H. Abrahams, W. P. Attrill, A. J. Badcock, F. E. Baker, A. Barrass, J. E. Bessant, L. Bond, J. A. Bowden, C. C. Brock, A. J. Brockington, F. D. L. Brown, A. J. Cardy, G. H. Carr, H. S. Clark, T. H. Collett, H. W. Collins, H. Comben, F. J. B. Connock, W. A. R. Cronk, T. A. J. Davis, J. H. Daykin, W. J. Eddey, E. Empson, D. E. Fairless, C. E. Gates, W. F. Gaynor, W. J. R. Gent, B. F. Gundry, S. R. Gwyther, T. H. Hayter, L. G. J. Hoskin, R. J. Jones, G. R. Knight, G. W. Knopp, A. C. Launder, S. E. A. Leath, B. Lelliott, J. C. S. Lovegrove, A. H. Lyddon, E. H. Mackay, W. B. Mason, A. E. Massey, E. Matthews, A. R. G. Maxwell, B. S. Millman, F. R. Morris, E. F. Nettlefold, C. H. Northey, T. E. M. Palmer, P. E. Parker, C. S. Payne, G. A. Povey, W. J. Price, J. F. Rae, W. D. Rendell, H. T. Robbins, D. A. Robertson, E. C. Roe, G. H. M. Salkeld, H. Sampson, F. J. Sparrow, S. R. A. Strickland, L. H. C. Walcroft, C. E. Waller, W. H. Warren, S. J. Warwick, S. Webb, C. F. G. White, M. E. Whittington.

LEAVING THE PALACE: Air Comdre. C. R. Carr, D.F.C., A.F.C., after being invested with the insignia of C.B.E. Air Comdre. Carr once flew a Hawker Horsley non-stop from Cranwell to the Persian Gulf, and in 1937 was Senior Air Officer in H.M.S. *Eagle*.

CORPORALS.

R. A. Catchpole, E. J. W. Collins, C. B. Deeks, E. A. Edwards, B. Harris, E. E. Little, L. H. Stone.

Middle East Awards

HIS MAJESTY THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy.

BAR TO DISTINGUISHED FLYING CROSS.

Sqn. Ldr. A. GOLDING and Flt. Lt. W. S. PERIOLI.

DISTINGUISHED FLYING CROSS.

Flt. Lt. M. J. BAIRD-SMITH; Capt. J. E. FROST, South African Air Force; F/O. A. F. A. OSBORN; and P/O. J. H. M. DAVIES.

DISTINGUISHED FLYING MEDAL.

Sgt. H. BOWEN.

The decoration awarded to Capt. Frost is in recognition of his feat in destroying five enemy aircraft in two days in Italian East Africa. On one occasion he patrolled 180 miles into enemy territory to look for enemy aircraft which had been reported in the vicinity. At Afmadu he sighted an enemy bomber on the ground and destroyed it by machine-gun fire. Next day he encountered a formation of three enemy bombers escorted by two fighters which were attacking our ground forces. He immediately attacked two of the bombers, and while doing so was attacked in turn by the two fighters, which dived at him from ahead. He shot down one of the fighters, and the other avoided combat by taking cover in the clouds. He again turned his attention to the bombers and found that the two which he had attacked were losing height rapidly. Both crashed. Then he pursued the remaining bomber and shot it down. All these victories have been confirmed.

F/O. Osborn was captain of a heavy bomber detailed to carry out a night raid on an aerodrome in Catania. After dropping bombs on the target, he descended to 400 ft. through intense and accurate fire. He machine-gunned anti-aircraft guns and searchlights and put a number of them out of action. His aircraft was struck several times by anti-aircraft shells. The petrol tanks were punctured and most of the fabric stripped from one wing. He turned back to his base and had flown 140 miles on the homeward journey when he was compelled to come down on the sea. He brought his aircraft down close to a naval vessel. One of the crew had been wounded, and F/O. Osborn supported him in the water for half an hour until they were rescued. This officer has carried out thirty operations against Germany and Italy.

An outstanding part in a night raid on Rhodes Island was played by Flt. Lt. Baird-Smith. Owing to extremely bad weather, the attack had to be made at a low altitude. In spite of intense fire from light anti-aircraft guns, Flt. Lt. Baird-Smith dropped his bombs from 1,000 ft. and then came down to 200 ft. and machine-gunned aircraft dispersed around the aerodrome. He started two very large fires and, in addition, destroyed at least two multi-engined aircraft. This officer's aircraft was holed in sixteen places, both petrol tanks being punctured. He nevertheless succeeded in bringing his aircraft safely back to his base and made a valuable report.

P/O. Davies was the navigator of an aircraft detailed to attack an important aerodrome in Sicily. On returning from the flight, P/O Davies learned that an observer was required for an aircraft just about to start on a raid on the same

SERVICE AVIATION (Continued)

aerodrome. He promptly got into the aircraft and returned to the target.

Sqn. Ldr. Golding received his decoration for courage and the determination with which he carried out a successful attack on aerodromes on Rhodes Island. In spite of low cloud, rain and poor visibility, this officer located his targets and attacked them from low altitudes. His aircraft was hit several times by anti-aircraft fire, but in addition to carrying out the raid Sqn. Ldr. Golding also succeeded in obtaining vital information regarding aerodromes attacked and aircraft dispersed on them.

Flt. Lt. Perioli has carried out thirty operations over Germany and fifteen over Italy. He has shown extreme keenness and courage on these raids, and has always been to the fore in volunteering for operations. On several occasions he has offered to fly ahead in order to test the weather before the main body of the squadron took off.

Sgt. Bowen, an air gunner of great enthusiasm and courage, has been on more than 32 operational flights, during which he has shot down a number of enemy aircraft. On one occasion when in the leading aircraft of a formation attacking a target in Albania, he maintained a fierce fight with enemy fighters, shot down one of them in flames and by skilful gunfire assisted other aircraft in the formation when they were hard pressed.

Prisoners of War

NEXT of kin, if able to identify the men from the information published, are requested to advise the Casualty Branches of the Services concerned, forwarding Regimental or any other details.

The following are the latest names of British prisoners of war as received from enemy sources:—

IN GERMAN HANDS.

P/O. W. G. Matheson, Stanford Avenue, Royston, Herts.

P/O. G. Hill, East Huntspill, Highbridge, Somerset.

Sgt. D. L. Burton, Woodland, Beverley, Yorks.

Sgt. J. M. Garrett, P.O. Box 172, Auckland, New Zealand (also announced on February 2nd).

P/O. N. A. Saville (possibly Favel), Chain Avenue, Snaresbrook, E.18.

Sgt. R. T. Eastwood, Somerton Road, Bristol.

Sgt. W. J. Baird, Lairg Cottage, Sands Estate, Kincardine, Scotland.

Sgt L. W. Howard, Jenner Road, London.

Sgt. R. Hawkes, South View Farm, Hampsthwaite, Harrogate, Yorks.

Sgt K. H. Jones, Fernlea, New Road, Bromsgrove, Worcestershire.

Sgt. H. D. Denchfield, Kemercourt Road, Hemel Hempstead, Herts.

Flt. Lt. R. J. McConnell, Kesh, County Fermanagh, North Ireland.

Sgt. Eric Walter Green, London Road, Whimple, near Exeter.

Sgt. D. E. Bristow, Old Farm Road, Guildford, Surrey.

London Gazette

Royal Air Force

Air Ministry,
Feb. 14, 1941.

General Duties Branch.

The follg. are granted commns. for the duration of hostilities:—As F/O. on probn.:—Warrant Officer; (Jan. 15) E. J. Greenwood. As P/Os on probn.:—Warrant Officer: (Jan 24) C. S. Grossey. Sergeants: (Jan. 8) J. G. MacCoubrey, D.F.M.; (Jan. 10. Sen. Sept. 23, 1940) D. V. H. Thomas; (Jan. 10) W. R. Greenslade; (Jan. 17) A. J. Hawkins, D.F.M.; (Jan. 17) R. S. Ayton, D.F.M.; (Jan. 17, Sen. Aug. 14, 1940) J. J. Curtis; (Jan. 18) E. P. Eastwood; (Jan. 21) A. R. Cadman, D.F.M., V. R. Smith; (Jan. 24, Sen. Aug. 14, 1940) A. G. Dickenson; (Jan. 25) E. F. W. Clarkson. Temporary Sergeants: (Jan. 10, Sen. Sept. 23, 1940) S. W. Anderson, D. C. Moore.

The follg. P/Os. on probn. are confirmed in their appts. and promoted to the war substantive rank of F/O.: (Sept. 23, 1940) H. D. Wardle; (Oct. 1, 1940) G. K. R. Drimmie; (Nov. 18, 1940) D. MacDonald; (Dec. 9, 1940) P. H. de K. Bocock; (Dec. 23, 1940) C. B. Temlett, D.F.C.; (Jan. 17) C. A. Kidd, T. A. Whiting, D.F.C., P. Burnhill, L. H. Ewels, W. H. Hill, J. S. C. Morgan, F. J. Rimer.

The follg. F/Os. are granted the war substantive rank of Flt. Lt.:—(Dec. 6, 1939) A. D. Jackson (substituted for notifn. of Oct. 18, 1940); (Mar. 1, 1940) W. R. Farnes; (Aug. 1, 1940) J. F. Mehigan (ret.).

The follg. F/Os. are promoted to the war substantive rank of Flt. Lt.:—(Nov. 10, 1939) D. H. C. Hull; (Sept. 3, 1940) I. G. C. Malcolm, G. V. T. Shaen-Carter, K. H. P. Murphy; (Sept. 8, 1940) W. M. Nixon, D.F.C.; (Oct. 15, 1940) D. Blew; (Nov. 5, 1940) G. E. Walker; (Dec. 1, 1940) S. W. R. Hughes; (Dec. 5, 1940) M. R. Skeet; (Dec. 6, 1940) J. Stewart; (Dec. 10, 1940) V. G. Bamber, H. W. Barnard, T. H. Davison, J. G. Day, W. G. New, W. B. Price-Owen, R. E. Ridgway, C. L. Wright; (Dec. 18, 1940) C. S. Bartlett, A. E. Pain; (Dec. 31, 1940) R. N. Cullen, E. Q. Moody; (Jan. 15) G. B. F. Cousens; (Jan. 24) F. C. Gibbs; (Jan. 30) R. C. Rotheram, D.F.C.; (Feb. 3) P. G. Whitby; (Feb. 9) E. P. Willcox, D.F.C.

The follg. P/Os. are granted the war substantive rank of F/O.:—(Dec. 5, 1939) F. C. Phillips (ret.); (Aug. 8, 1940) F. E. Eustace, D.F.C. (substituted for notifn. of Oct. 8, 1940); (Dec. 5, 1940) C. F. Currant, D.F.C.; (Dec. 6, 1940) W. J. Lawson, D.F.C., G. Allard, D.F.C., D.F.M.

The follg. P/Os. are promoted to the war substantive rank of F/O.:—(May 28, 1940) L. Miller; (Aug. 17, 1940) K. S. Tolt; (Sept. 5, 1940) S. G. Esson, C. H. Jordan, J. M. Lewis, H. M. Murray, C. D. Regan, G. P. Robertson; (Sept. 25, 1940) P. G. Brodie; (Oct. 2, 1940) D. S. Dickins; (Oct. 21, 1940) J. T. Glover, A. C. Meigh, E. R. Mullins; (Nov. 6, 1940) J. H. T. Palmer; (Nov. 18, 1940) R. F. Beauchair; (Nov. 29, 1940) A. G. Lewis, D.F.C.; (Dec. 3, 1940) F. R. Bullot, R. Garside; (Dec. 9, 1940) R. C. W. Broad, C. A. G. Clark, G. F. Grant, D. F. M. MacKarness; (Dec. 10, 1940) P. A. Worrall; (Dec. 16, 1940) G. M. Head, D. M. Lake, A. G. Wright; (Dec. 27, 1940) L. W. Collingridge; (Dec. 28, 1940) R. A. Mosley; (Jan. 6) H. A. R. Prowse, M. T. H. Adams, D.F.C., J. G. K. Long, E. B. Rendall, R. R. Sandford; (Jan. 17) G. N. Parker.

The follg. are transferred to the Technical Branch (Apr. 24, 1940):—Wing Cdrs.: E. W. Broadberry, M.C., H. M. G. Parker, W. A. Tattersall, R. C. Wansbrough, J. H. Winch. Sqn. Ldr. (since promoted): H. J. Walker. Flt. Lts.: A. Ovenden (since promoted), A. A. F. Hickman (since promoted), C. A. C. Fidler, D.C.M. (Ret.), C. E. Sims.

Group Capt. L. W. B. Rees, V.C., O.B.E., M.C., A.F.C. (ret.), relinquishes at his own request the rank of Group Capt. whilst re-employed with the R.A.F., and is granted the rank of Wing Cdr. (Jan. 21).

P/O. J. S. Heath (Lt., R.A., T.A.) relinquishes his temp. comma. on return to Army duty (Jan. 8).

P/O. G. E. Ellis relinquishes his short service comma. on account of ill-health (Feb. 11).

Technical Branch.

The follg. are granted commns. for the duration of hostilities:—As F/O. on probn.:—Warrant Officer: (Jan. 28) J. D. Bird. As P/Os. on probn.:—Warrant Officer: (Jan. 25) W. H. Cauley. Flight Sergeants: (Nov. 11, 1940) J. B. Richardson; (Jan. 20, 1940) W. N. Gibson; (Jan. 22) R. A. Foster.

The follg. F/Os. on probn. are confirmed in their appts.:—(Sept. 11, 1940) H. G. Blake; (Sept. 27, 1940) J. E. Manton; (Nov. 7, 1940) G. A. Cardwell; (Jan. 5) C. E. Edge.

The follg. Flt. Lts. are promoted to the rank of Sqn. Ldr. (temp.):—(Sept. 1, 1940) C. A. C. Fidler, D.C.M. (ret.); (Dec. 1, 1940) C. E. Sims.

The follg. F/Os. are granted the war substantive rank of Flt. Lt.:—(June 1, 1940) F. Evans, D.F.M.; (Dec. 6, 1940) F. Wicks, M.B.E.; (Dec. 18, 1940) R. C. Pearson.

P/O. R. D. Romanis is granted the war substantive rank of F/O (Dec. 13, 1940).

The follg. P/Os. are promoted to the war substantive rank of F/O. (Mar. 26, 1940. Sen. June 26, 1939):—D. W. Rowson, E. J. Ryder.

Administrative and Special Duties Branch.

The follg. are granted commns. for the duration of hostilities:—As P/Os. on probn.: Warrant Officers: (Jan. 15) A. H. L. Pearce; (Jan. 16) P. A. V. Charlesworth. Sergeant: (Dec. 6, 1940) L. Cook. As Act. P/O. on probn.:—Flight Sergeant: (Jan. 24) F. McNally.

Act. P/O. on probn. J. F. Hockey is graded as P/O. on probn. (Dec. 21, 1940).

The follg. P/Os. are granted the war substantive rank of F/O.:—(Dec. 1, 1940) A. S. Cooper, J. R. Jackson; (Dec. 4, 1940) J. W. Taylor; (Dec. 11, 1940) I. W. Mitchem; (Dec. 17, 1940) C. H. Beeton; (Dec. 24, 1940) H. H. Russell, E. Maidment.

P/O. on probn. L. J. Gilbert is promoted to the war substantive rank of F/O. on probn. (Dec. 1, 1940).

Equipment Branch.

P/O. G. N. Blake is confirmed in his appt. (Jan. 2, 1940), and granted the war substantive rank of F/O. (Dec. 18, 1939). (Substituted for notifn. of Feb. 6, 1940.)

The follg. P/Os. are confirmed in their appts. (Aug. 17, 1940) and granted the war substantive rank of F/O.:—(May 6, 1940) R. M. Hall (substituted for notifn. of Nov. 19, 1940); (June 11 1940) F. J. Ford (substituted for notifn. of Nov. 26, 1940).

The follg. P/Os. are granted the war substantive rank of F/O.:—(Apr. 24, 1940) G. E. Tweddle (substituted for notifn. of Oct. 29, 1940); B. C. A. Fox (substituted for notifn. of Oct. 8, 1940); (Dec. 13, 1940) H. J. C. Whitmee.

The follg. F/Os. are granted the war substantive rank of Flt. Lt.:—(Mar. 3, 1940) E. R. Hoare (substituted for notifn. of Oct. 8, 1940); (July 12, 1940) H. A. May, M.B.E.

Accountant Branch.

The follg. are granted commns. for the duration of hostilities (Jan. 24.):—As F/O. on probn.: W/O. E. Biddle. As P/O. on probn.: W/O. H. Greaves. As Act. P/O. on probn.: Sgt. T. D. F. Colgan.

The follg. P/Os. are confirmed in their appts. July 29, 1940, and granted the war substantive rank of F/Os.:—(Apr. 3, 1940) R. B. Evans (substituted for notifn. of Oct. 4, 1940); (July 15, 1940) C. A. Pitt (substituted for notifn. of Nov. 12, 1940).

The follg. P/Os. are granted the war substantive rank of F/O.:—(Dec. 6, 1939) F. E. Crosland (substituted for notifn. of Oct. 8, 1940); (Dec. 14, 1939) J. A. Bryden (substituted for notifn. of Oct. 8, 1940); (Jan. 6, 1940) T. Alderson (substituted for notifn. of Oct. 8, 1940).

P/O. J. Lee is granted the war substantive rank of Flt. Lt. (Dec. 17, 1940).

P/O. on probn. A. G. J. Bullough relinquishes his comma. on account of ill-health (Feb. 6).

Medical Branch.

Group Capt. Sir A. W. Iredell, K.B.E., C.B., M.R.C.S., L.R.C.P. (ret.), reverts to the retired list (Feb 1), and resumes with effect from that date the rank of Air Vice-Marshal (Sen. Jan. 1, 1936).

Dental Branch.

Flt. Lt. H. D. Humphreys, L.D.S., is granted a permanent comm. (July 1, 1940), and is granted the war substantive rank of Sqn. Ldr. (Feb. 11, 1940) (substituted for notifn. of July 30, 1940).

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS.

General Duties Branch.

F/O. A. J. S. Morris is granted the war substantive rank of Flt. Lt. (Nov. 29, 1940).

F/O. R. W. Read, M.C., is promoted to the war substantive rank of Flt. Lt. (Dec. 11, 1940).

Royal Air Force Volunteer Reserve

General Duties Branch.

The follg. are granted commns. for the duration of hostilities as P/Os. on probn.:—(Jan. 24) W. J. F. Atlee. Sergeants: (Jan. 11) C. W. S. Bristow; (Jan. 17) J. D. Keynes; (Jan. 18) F. Krauter; (Jan. 18) R. L. Elliot, W. F. Rathbone, B. F. Collins; (Jan. 20) J. W. Allan, D. B. McGregor, J. W. Welford, R. J. Healey; (Jan. 23) R. W. Sheppard; (Jan. 26) N. S. L. Sient. Act. Sergeant; (Jan. 20, Sen. Sept. 19, 1940) J. E. Bosley. Leading Aircraftmen: (Nov. 16, 1940) J. A. H. King; (Dec. 2, 1940) M. F. Wynne-Willson, H. G. S. Wyrill; (Dec. 9, 1940) I. A. St. C. Watson; (Dec. 14, 1940) J. S. Humphreys; (Dec. 29, 1940) R. U. Gee, A. H. Gibb, T. C. Hood, G. L. Conner, W. H. Stephens, A. C. Burton; (Dec. 30, 1940) J. Arnsby, H. C. Babington, G. R. M. Buley, M. G. Calvert, B. C. Holman; (Dec. 30, 1940) A. Grout, L. A. Martin; (Jan. 11) B. A. Childs, D. M. Weston, V. K. Brown, I. C. Burke, R. Hilton, H. J. Sellers, D. C. H. Stamford, T. F. Tyrrell; (Jan. 12) J. A. Breckell, G. F. Burbridge; (Jan. 15) D. W. Lintern; (Jan 15) G. A. F. Buchanan, P. Farragut, G. H. Ranger, M. D. Wylie, A. M. De la P. Dixner, N. H. C. Keable, G. A. B. Lord, D. S. Pont, P. J. B. Veitch, R. I. P. Mackenzie, J. S. Taylor; (Jan. 15) A. G. S. Anderson, H. Blackall, J. C. M. Booth, J. D. Clements, N. J. Durrant, F. A. O. Gaze, I. S. O. Gaze, R. R. Price, A. J. Reeves, G. C. Smillie; (Jan. 15) D. Brocklehurst, G. A. Harrison, G. R. Lane, R. A. Newbery; (Jan. 18) D. C. McNeil, M. V. Christopherson; (Jan. 18) J. R. Davies, J. Smith, M. J. Courtman-Stock; (Jan. 18) G. W. H. Allerton, C. J. H. Bignell, E. A. W. Paterson, J. Rintoul, F. S. Willis, S. G. Wright, T. H. E. Goldie, R. H. Golightly, F. A. Rabagliati, E. N. Woods, W. J. Chase, R. W. Cooper, E. R. Davis, H. M. McGuffie, J. Mares, H. S. Turner, T. E. O. Andrews, D. A. Backhouse, R. J. M. Evans, J. M. Helme, P. A. Searle; (Jan. 18) R. E. Miller, E. W. Kinchin, L. J. Porter, G. E. Poulton, H. Wilson; (Jan. 18) H. R. Astbury, T. B. Herd, K. B. Orr, J. G. Owen-King, J. A. C. Parsons, R. A. Walker.

The follg. P/Os. on probn. are confirmed in their appts. on Nov 5, 1940, and promoted to the war substantive rank of F/O.:—(Dec. 11, 1940) J. T. Marshall; (Dec. 17, 1940) J. D. Croft.

The follg. P/Os. are promoted to the war substantive rank of F/O.:—(Sept. 25, 1940) J. P. North Lewis; (Oct. 3, 1940) J. C. W. Bushell.

The follg. P/Os. on probn. are confirmed in their appts. and promoted to the rank of F/O.:—(Nov. 27, 1940) C. H. Wilson; (Dec. 1, 1940) J. MacG. Talman, D.F.C.; (Dec. 6, 1940) J. J. Veasey; (Dec. 7, 1940) J. F. Marsh; (Dec. 9, 1940) J. Bowie; (Dec. 10, 1940) J. D. Bisdee, M. Bryan-Smith, H. C. Flemons, M. L. Haigh, P. R. Hairs; (Dec. 24, 1940) J. Lotsdail.

P/O. on probn. R. H. Bacon is confirmed in his appt. and promoted to the war substantive rank of F/O. (Nov. 8, 1940) (substituted for notifn. of Dec. 20, 1940).

The follg. Act. P/Os on probn. are graded as P/Os. on probn.:—(Sept. 17, 1940) G. G. Sharp; (Nov. 21, 1940) J. E. Johnston.

The follg. F/Os. are promoted to the war substantive rank of Flt. Lt.:—(Dec. 7, 1940) J. R. Rathbone, M.P.; (Feb. 10) J. B. Hall.

F/O. A. G. Douglas is granted the war substantive rank of Flt. Lt. (Aug. 1, 1940) (substituted for notifn. of Sept. 20, 1940).

The follg. P/Os. are granted the war substantive rank of F/O.:—(Feb. 11, 1940) L. E. Clark, D.F.C.; (May 15, 1940) A. F. P. Fane; (Dec. 1, 1940) N. Ibrahim; (Dec. 2, 1940) R. C. Fishlock; (Dec. 15, 1940) H. J. V. Ashworth; (Dec. 21, 1940) D. E. I. Clark; (Dec. 29, 1940) H. C. Mavers, D.F.C.

The follg. are transferred to the Administrative and Special Duties Branch:—P/O. on probn.: (Jan. 29) J. Morris. Act. P/Os. on probn.: (Jan. 25) R. A. Pinchen; (Feb. 3) R. J. Le Grand.

Technical Branch.

W. S. Ball is granted a comm. for the duration of hostilities as P/O. on probn. (Dec. 1, 1940) (substituted for notifn. of Jan. 7).

The follg. are confirmed in their appts.:—Flt. Lts. on probn.: (Dec. 4, 1940) J. N. H. Brooke. (Jan. 26) C. G. James. F/O. on probn.: (Dec. 29, 1940) E. R. H. Johnston. P/Os on probn.: (Sept. 28, 1940) J. M. R. Sutton; (Oct. 30, 1940) A. M. de Hauteville Bell; Dec. 10, 1940) D. H. Johnson.

The follg. P/Os. on probn. are confirmed in their appts. and promoted to the war substantive

SERVICE AVIATION (Continued)

rank of F/O.:—(Dec. 6, 1940) J. A. Brooks; (Dec. 11, 1940) I. Campbell-Bruce; (Dec. 31, 1940) C. S. Fell, T. R. Rouson; (Jan. 14) D. B. G. Miles.

F/O. R. G. Goodfellow is granted the war substantive rank of F/O. (Aug. 31, 1940).

The follg. P/Os. are granted the war substantive rank of F/O.:—(May 21, 1940) W. D. A. Smith; (Oct. 26, 1940) W. L. Gordon; (Dec. 1, 1940) J. E. Lonsdale; (Dec. 12, 1940) S. B. Bailey; (Dec. 16, 1940) L. Wynne-Owen; (Dec. 25, 1940) J. Spinks, J. N. Walker.

Balloon Branch.

The follg. are granted comms. for the duration of hostilities as P/Os. on probn.:—Corporals: (Dec. 30, 1940) H. A. Hammond, C. Hodgson, N. H. Moth; (Jan. 24) F. H. Shortt. Leading Aircraftman: (Jan. 26) J. H. Anstey. Aircraftman 1st Class: (Jan. 25) A. M. Parry. Aircraftman 2nd Class: (Jan. 24) L. C. Maggs.

The follg. P/Os. are granted the war substantive rank of F/O.:—(Dec. 1, 1940) D. A. Willmott; (Dec. 2, 1940) A. G. Shepard; (Dec. 18) P. H. Layton, F. C. Seldon; (Dec. 19, 1940) H. J. Ball; (Dec. 24, 1940) E. J. C. Smither; (Dec. 28, 1940) G. G. Fowler.

Administrative and Special Duties Branch.

The follg. are granted comms. for the duration of hostilities:—As F/Os. on probn.: (Dec. 16, 1940) T. H. Bridgewater, G. W. H. Larkby, R. E. Young; (Dec. 30, 1940) S. R. Chapman; (Jan. 17) A. V. White. As P/Os. on probn.: (June 12, 1940) I. F. Anderson; (Oct. 4, 1940) A. Scougall; (Oct. 18, 1940) C. P. Barratt; (Oct. 22, 1940) E. B. Eddy; (Oct. 28, 1940) E. Y. Lapham; (Nov. 7, 1940) C. A. MacD. Anderson, E. S. Beachcroft, C. R. Coleman, S. R. Cox, B. G. Edgell, C. W. K. Ellem, A. J. M. Fabian, R. R. Fenner, F. C. Francis, A. O. Gaze, W. S. A. Giles, G. A. Grant, J. A. Hillier, A. V. Jentsch, D. W. Kirk, M. A. A. Kirkpatrick, R. H. C. Laidlaw, N. N. Matthews, C. V. Nyren, L. E. A. Robinson, T. J. K. Starr, J. H. Tonkin, E. E. Tyler, T. Welham, W. H. Young; (Nov. 16, 1940) J. G. Harris; (Dec. 12, 1940) B. C. N. Wallich; (Dec. 16, 1940) D. James; (Dec. 27, 1940) J. L. W. Hodgson, D. Vernon; (Jan. 3) F. P. Withall; (Jan. 8) E. W. Dawson; (Jan. 10) D. S. Hay, E. Wittmann; (Jan. 11) H. W. Clover, A. J. P. Hegney; (Jan. 13) R. M. Inge, P. M. J. Koch de Gooreynd; (Jan. 17) C. S. Barnes, C. E. Bemrose, V. J. M. Bosher, J. Burns, B. O. Byass, M. W. Delaforce, H. M. Dutton, A. E. Gibson, A. G. Golby, A. Gorrie, B. Haller, W. C. Halsey, C. M. Hare, T. O. Harker, W. R. Harrison, J. H. W. Harrison-Broadley, R. C. Hilliam, S. J. Hunt, W. Jack, H. L. Jones, E. A. Kelsey, K. G. P. Kimber, G. P. Kingdon, H. J. Langham, R. McKendrick, N. F. Millington, D. F. L. Mills, K. A. H. Murray, D. A. Neilson, R. J. G. Parr, C. E. Parrott, J. W. E. Parsons, C. E. Potter, R. I. Rankin V. E. Reece-Ford, R. C. Roberts, K. Smallman-Tew, G. N. Stephenson, A. G. Stevens, H. M. Stokes, T. A. Symes, C. C. Worters, C. B. White; (Jan. 18) A. L. Barnes, D. C. Daly; (Jan. 20) W. P. Thomas; (Jan. 22) C. Gordon; (Feb. 4) E. Downing. As Act. P/Os. on probn.:—Sergeant: (Jan. 24) H. O'Neill. Corporal: (Jan. 20) J. L. Worrow. Aircraftman 2nd Class: (Jan. 24) B. V. Bartlett.

The follg. are confirmed in their appts.:—F/Os. on probn.: (Sept. 26, 1940) M. C. Radford; (Nov. 6, 1940) G. S. Cowan; (Nov. 14, 1940) S. T. L. McLaglen; (Nov. 15, 1940) C. E. Lovett-Campbell; (Nov. 18, 1940) R. G. H. Adams; (Jan. 22) V. P. Brooks; (Jan. 31) C. H. W. Frost. P/Os. on probn: (Sept. 9, 1940) S. F. Tolman, C. W. Wrightson; (Sept. 19, 1940) F. H. Hudson, H. A. Moncrieff; (Sept. 26, 1940) H. Buie, D. Grant, R. Williamson; (Oct. 3, 1940) W. B. Calder, H. Morris; (Oct. 7, 1940) G. F. Dugdale; (Oct. 9, 1940) J. Lomas, J. D. Heaton-Armstrong, M.V.O.; (Dec. 4, 1940) W. J. Henney; (Dec. 31, 1940) D. L. Doyle; (Jan. 29) A. G. C. Colquhoun.

The follg. P/Os. on probn. are confirmed in their appts. and promoted to the war substantive rank of F/O.:—(Sept. 9, 1940) J. L. Cave; (Sept. 19, 1940) J. S. Wood; (Oct. 10, 1940) S. J. Wise; (Oct. 23, 1940) A. J. Croar; (Nov. 11, 1940) P. R. S. Gibson; (Nov. 13, 1940) R. G. Chester; (Nov. 23, 1940) C. A. M. Furlonger; (Nov. 27, 1940) H. J. W. Grainger, J. W. H. Hiscocks, L. A. Jackson, R. E. Stevens; (Dec. 2 1940) A. L. Gates; (Dec. 10, 1940) G. W. Hignett; (Dec. 12, 1940) W. B. van N. Weld; (Dec. 15, 1940) J. C. Green, D.F.C.; (Dec. 19, 1940) L. S. J. Dustan, G. W. H. L. Stout; (Dec. 29, 1940) G. H. Brindley, J. McA. Goddard; (Dec. 30, 1940) L. Pearl; (Dec. 31, 1940) R. A. S. Moss; (Jan. 10) R. C. C. Allen; (Jan. 22) H. V. L. Tubbs, F. Wood; (Jan. 29) G. S. Charlesworth; (Jan 30) C. E. Trippe.

The follg. Act. P/Os. on probn. are graded as P/Os. on probn.:—(April 14, 1940) J. S. Olliff; (Nov. 29, 1940) C. F. Colyer.

The follg. P/Os. are granted the war substantive rank of Flt. Lt.:—(May 27, 1940) J. B. Mackie; (Oct. 1, 1940) J. McL. G. Taylor, E. E. Hodgson G. H. Cradock, M.C., A. C. E. Marsh, A. Hacking, D.S.O., M.C.

The follg. P/Os. are granted the war substantive rank of F/O.:—(Dec. 18, 1939) G. F. Ward; (Jan. 9, 1940) R. W. S. Winter; (Feb. 22, 1940) M. A. Newnham, D.F.C.; (April 5, 1940) L. H. Wilkins, D.S.C.; (April 8, 1940) F. H. Hudson; (May 1, 1940) W. G. Clarke, J. Jameson; (May 15, 1940) E. L. Fuller; (May 27, 1940) M. K. Forsyth (substituted for notifn. of Oct. 29, 1940.):—(June 7, 1940) P. N. Shone; (June 12, 1940) F. D. Berridge; (July 15, 1940) R. V. Mosse; (Aug. 19, 1940) P. W. Evans; (Aug. 20, 1940) E. J. Carthew; (Aug. 22, 1940) C. W. Aschan; (Aug. 27, 1940) F. A. Cockburn; (Sept. 10, 1940) W. Davies; (Sept. 12, 1940) D. H. King; (Sept. 15, 1940) J. P. Armitage; (Sept. 24, 1940) J. R. Combe; (Oct. 3, 1940) H. Allen; (Oct. 22, 1940) F. E. Godfrey; (Nov. 10, 1940) R. A. Mitchell; (Dec. 1, 1940) H. H. W. Pope, J. L. Hall, H. B. Stonebridge, A. R. Nock, D.F.C., E. C. S. Weale, C. R. O'Brien, A. J. Graham-Wigan, M.B.E., L. E. Provis, M. M. Elrington, P. C. Thornton, B. A. R. Shore, L. G. Black, Sir E. H. C. P. Bellingham, Bart., C.M.G., D.S.O.; (Dec. 3, 1940) J. H. L. H. Davies, J. Town, D.F.C., C. D. Bennett, G. I. Fry; (Dec. 4, 1940) J. N. K. Le Fleming-Shepherd, M. J. P. Lacy, H. R. Spencer, G. W. Holderness, D.F.C., A. E. Thompson; (Dec. 5, 1940) The Rt. Hon. Wedgwood Benn, D.S.O., D.F.C., M.P., S. A. Hargrove, T. F. V. Matthews, M.C.; (Dec. 8, 1940) Sir R. W. Boord; (Dec. 9, 1940) R. C. Symondson; (Dec. 10, 1940) D. Roberts; (Dec. 11, 1940), N. Zambra, M.C., A. F. Wharton; (Dec. 12, 1940) D. S. Allom, L. G. Blomfield; (Dec. 13, 1940) L. Lockhart, R. O. Gregory, The Hon. G. R. Bellew, M.V.O.; (Dec. 14, 1940) G. H. Tripp, V. R. Waters; (Dec. 15, 1940) S. F. Clifford, K. C. Smith, Sir L. Twiston-Davies, K.B.E., R. D. Brett, C. H. G. Millis; (Dec. 17, 1940) G. C. Hicks, T. R. F. Brook, F. Armitage-Smith; (Dec. 18, 1940) J. S. Walker, G. H. Ramsay, F. A. Wray, M.M.; (Dec. 19, 1940) D. L. Doyle; (Dec. 20, 1940) S. H. Gaskell, C. A. Robinson, H. I. Wood, P. C. Carter, H. P. Hamilton; (Dec. 21, 1940) J. G. B. Hutchings, W. S. Brundish, A. L. S. O'Beirne, F. J. N. Barber, M.C., B. M. Bellasis, M.C., A. G. Hart; (Dec. 22, 1940) J. Burr; (Dec. 23, 1940) H. S. Hurrell, E. A. R. Briant, F. V. Jobling, D. A. Raeburn; (Dec. 24, 1940) G. Andrews, M.C., C. E. Bryant, D.S.O., F. J. Howard, N. G. Wright; (Dec. 25, 1940) I. F. E. Thoday, R. C. Udall; (Dec. 26, 1940) C. P. L. Firth, J. L. Purdy; (Dec. 27, 1940) The Earl of Tankerville; (Dec. 28, 1940) N. Catt, R. S. Lymberv; (Dec. 30, 1940) F. M. M. Beerling, J. R. Wardrop, F. C. Walker, D.C.M.

F/O. S. A. Hamilton-Bower is transferred to the General Duties Branch (Oct. 3, 1940).

The follg. are transferred to the Technical Branch:—P/Os. on probn.: (April 24, 1940) J. H. B. Hum (since promoted), W. A. Wales, E. Drew; (June 22, 1940) A. H. Ratcliffe, F. J. Heath; (June 24, 1940) D. C. Davies; (Aug. 16, 1940) S. W. P. Henton; (Oct. 13, 1940) A. K. Webb; (Nov. 11, 1940) A. J. Buxton; (Nov. 13, 1940) S. A. Hatfield.

The follg. relinquish their commns. on account of ill-health:—Flt. Lt.: (Feb. 8, 1940) A. A. Nathan. F/O.: (Feb. 7) F. Boyd. P/O. on probn.: (Feb. 5) A. W. Marshall; (Feb. 10) K. A. Hiskens; (Feb. 11) P. H. E. Grisewood, T. F. Johnson.

The follg. resign their commns.:—F/O.: (Jan. 25) G. Hamilton-Brown. P/Os. on probn.: (Feb. 1) E. A. Beachcroft, N. K. Worthington, L. D. Stuart.

The comm. of P.O. on probn., P. A. Monckton, is terminated on cessation of duty (Dec. 4, 1940).

Meteorological Branch.

A. H. Gordon is granted a commn. for the duration of hostilities as Act. P/O. on probn. (Feb. 4, 1940).

R. W. Hatcher is granted a commn. for the duration of hostilities as Act. P/O. on probn. (Sept. 12, 1939). (Substituted for notifn. of Sept. 19, 1939, under the heading Administrative and Special Duties Branch.)

F/O. on probn. G. J. Evans is confirmed in his appt. (Aug. 1, 1940).

The follg. P/Os. on probn. are confirmed in their appts. Aug. 1, 1940, and promoted to the war substantive rank of F/O. (Nov. 20, 1940):—D. C. Lloyd, N. B. Marshall, T. H. Tyler.

P/O. on probn. P. T. Silley is confirmed in his appt. Aug. 1, 1940, and promoted to the war substantive rank of F/O. (Nov. 21, 1940).

The follg. P/Os. on probn. are confirmed in their appts. Aug. 1, 1940, and promoted to the war substantive rank of F/O.:—(Jan. 15) E. A. Lunson, F. A. Walch.

P/O. on probn. G. W. Hall is confirmed in his appt. Aug. 8, 1940, and promoted to the war substantive rank of F/O. (Jan. 15).

P/O. F. Davies is promoted to the war substantive rank of F/O. (Oct. 31, 1940).

P/O. S. Proud is granted the war substantive rank of F/O. (Dec. 30, 1940).

Equipment Branch.

The follg. P/Os. are granted the war substantive rank of F/O.:—(Dec. 3, 1939) P. F. Humphreys, (substituted for notifn. of Jan. 23, 1940). (Jan. 26, 1940) A. W. Pim (substituted for notifn. of April 26, 1940); (May 6, 1940) F. C. Bowler; (July 8, 1940) The Hon. B. S. B. Plunket; (July 22, 1940) J. H. Hibbert, I. C. Swain; (July 23, 1940) H. R. Viend; (July 24, 1940) G. H. Harris; (July 30, 1940) J. McL. Paterson; (Sept 5, 1940) E. A. Waterton; (Dec. 1, 1940) R. D. George, H. G. Jones, B. F. Trevelyan; (Dec. 7, 1940) J. Beaton; (Dec. 16, 1940) B. W. P. Green; (Dec. 21, 1940) H. S. Jones, L. T. Jones, I. O. Fuller, R. J. Smith, J. Fearne.

Accountant Branch.

The follg. are granted comms. for the duration of hostilities as Act. P/Os. on probn.:—(Nov. 7, 1940) K. A. Edwards, K. Hartlett, U. C. Moore; (Jan. 13) F. W. C. Clarke; (Jan. 24) W. Bestwick, S. McA. Beswick, H. H. N. Drysdale, B. M. Greer, I. A. Jones, L. D. Parnell, R. Porter, T. Prentice, C. E. Saunders, A. C. Smith, F. E. Taylor, L. G. Taylor, G. W. Watkins, A. V. Williams, H. F. Wyatt. Aircraftman 2nd Class: (Jan. 24) D. Benoy.

The follg. P/Os. are granted the war substantive rank of F/O.:—(Dec. 4, 1940) E. E. Wilding; (Dec. 17, 1940) E. M. M. Henderson; (Dec. 29, 1940) J. Baines.

Act. P/O. on probn. H. Rollings is transferred to the Administrative and Special Duties Branch and graded as P/O. on probn. (Jan. 8).

Medical Branch.

P. D. Bedford, M.B., Ch.B., is granted a commn. for the duration of hostilities as F/O. (Jan. 7).

The follg. F/Os. are promoted to the war substantive rank of Flt. Lt.:—(Sept. 27, 1940) M. J. Lange, M.R.C.S., L.R.C.P.; (Nov. 1, 1940) W. H. Mirkin, M.B., Ch.B.; (Dec. 19, 1940) M. R. Chassels, M.B., Ch.B.; (Jan. 23) C. F. Hamilton-Turner, M.D., B.Ch., M.R.C.S., L.R.C.P.

Dental Branch.

The follg. are granted comms. for the duration of hostilities as F/Os.:—(Dec. 17, 1940) J. F. Herbert, L.D.S., F. J. Stewart, L.D.S.

The follg. F/Os. are promoted to the war substantive rank of Flt. Lt.:—(Nov. 14, 1940) J. E. Tudor, L.D.S.; (Dec. 5, 1940) R. E. Morgan, L.D.S.; (Jan. 2) F. E. Padgett, L.D.S.

Chaplains Branch.

The follg. are granted comms. for duration of hostilities with the relative rank of Sqn. Ldr.:—(Jan. 8) The Rev. L. Chidley; (Jan. 20) The Rev. H. Johnson, M.A.; (Jan 23) The Rev. J. P. O'Hea, Ph.D., D.D.

Auxiliary Air Force

General Duties Branch.

The follg. Act. P/Os. on probn. are confirmed in their appts. and graded as P/Os.:—(Sept. 17, 1939) G. Keighley (substituted for notifn. of May 14, 1940); (Oct. 6, 1939) T. S. Brotherstone (substituted for notifn. of May 4, 1940); (Dec. 1, 1939) G. H. E. Welford (substituted for notifn. of July 23, 1940); S. B. Parnall, D. K. A. Mackenzie, W. A. Douglas, J. Robinson, D. A. Braithwaite, S. G. Fenwick; (Dec. 2, 1939) D. E. Teden, I. K. S. Joll, A. R. Cousins (substituted for notifns. of April 26, 1940), A. C. Maclaren (substituted for notifn. of July 23, 1940); (Dec. 3, 1939) T. D. Williams, W. P. Barrell, T. B. Murray, J. Brewster, L. H. Casson, J. B. Hatchwell, A. L. B. Raven (substituted for notifns. of April 26, 1940); (Dec. 9, 1939) D. M. Crook, D.F.C., G. T. M. Mitchell, J. L. Smithers, P. W. Dunning-White, G. Gordon, M. J. Appleby, J. K. U. B. McGrath, D.F.C., P. A. Womersley; (Dec. 10, 1939) F. E. Clark, W. J. G. Morgan, J. W. Bland, F. Pilling (substituted for notifns. of June 4, 1940); (Jan. 4, 1940) A. E. Davies, R. C. Greenlees; (Jan. 11, 1940) J. R. G. Sutton, The Hon. P. I. Cunliffe-Lister; (Feb. 29, 1940) A. Obolensky (substituted for notifns. of April 26, 1940); (March 28, 1940) H. S. Thomas (substituted for notifn. of June 4, 1940); (April 1, 1940) S. F. F. Johnson; (April 5, 1940) C. D. Pain (substituted for notifns. of July 23, 1940); (April 11, 1940) P. B. Doorly; (May 10, 1940) R. P. Drummond; (May 27, 1940) C. J. Mackenzie, L. E. Stannard, G. Buckley, K. R. Aldridge, A. J. J. Truran, J. A. P. McClintock, P. Wilson, P. G. H. Pearson, L. Mackintosh (substituted for notifns. of Aug. 27, 1940), A. Kershaw, H. U. H. Tripp (substituted for notifns. of Oct. 4, 1940); (June 6, 1940) M. G. Pascalis; (June 7, 1940) G. N. Gaunt (substituted for notifns. of Aug. 27, 1940); (June 20, 1940) D. A. Sadler, J. T. Raffan, C. E. Hamilton, W. F. Crockart, R. MacKay, P. C. Weeks (substituted for notifns. of Oct. 8, 1940), H. G. Niven (substituted for notifn. of Nov. 5, 1940), D. H. Vandamm (substituted for notifn. of Nov. 12, 1940); (June 27, 1940) C. D. Strickland (substituted for notifn. of Sept. 20, 1940); (July 22, 1940) C. M. Elgar (substituted for notifn. of Nov. 26, 1940).

Act. P/O on probn. A. C. James is graded as P/O. on probn. June 20, 1940 (substituted for notifn. of Sept. 20, 1940).

The follg. F/Os. are promoted to the war substantive rank of Flt. Lt.:—(Sept. 3, 1940) W. O. Stern; (Dec. 13, 1940) G. W. B. Austin; (Jan. 26) A. Evre, D.F.C.

P/O A. W. Bacon is transferred to the Balloon Branch (March 27, 1940).

Balloon Branch.

The follg. P/Os. are granted the war substantive rank of F/O.:—(Dec. 9, 1939) G. H. Brown; (April 15, 1940) A. G. Brown.

Equipment Branch.

The notifn. of Dec. 20, 1940, regarding P/O. C. D. Newman should have appeared under the heading "General Duties Branch" and not "Equipment Branch."

Auxiliary Air Force Reserve of Officers

General Duties Branch.

P/O. A. M. Crawley is granted the war substantive rank of Flt. Lt. (Aug. 12, 1940).

Flt. Lt. G. P. Kerr is transferred to the Administrative and Special Duties Branch (Feb. 1).

Women's Auxiliary Air Force

The follg. are appointed Assist. Sect. Officers (Jan. 29, 1941):—A/CW.2 S. A. S. Carr, Cpl. P. M. Clay, A/CW.2 B. H. Coles, A/CW.1 J. F. Du Toit, A/CW.2 O. V. Evans, Sgt. E. M. Gaskell, Sen. Sgt. H. G. Kirby, Cpl. E. Merchant, Cpl. J. W. Nicholson, Sgt. A. H. Snell, C. P. E. Thatcher, A/CW.2 A. Worthington-Wilmer. (Feb. 1) A/CW.1 V. F. Lee, A/CW.2 F. M. C. Slater.

Assist. Sect. Officer I. L. C. Jourdain relinquishes her appt. on ceasing to be employed (Dec. 1, 1940).